Eleventh Workshop on Numerical Ranges and Numerical Radii

第十一屆數值域與數值半徑研討會

National Sun Yat-sen University, Kaohsiung, Taiwan

台灣・高雄・中山大學

July 9-12, 2012

Special guest: Pei Yuan Wu 吳培元(Taiwan)

Speakers

T. Ando (Japan), N. Bebiano (Portugal), Jor-Ting Chan (Hong Kong), Chi-Tung Chang (Taiwan), Wai-Shun Cheung (Hong Kong), M. D. Choi (Canada), Daeshik Choi (USA), Mao-Ting Chien (Taiwan), Chang-Pao Chen (Taiwan), M. Fiedler (Czech), Hwa-Long Gau (Taiwan), Anne Greenbaum (USA), John Holbrook (Canada), Nathaniel Johnston (Canada), David W. Kribs (Canada), Tsang-Hai Kuo（Taiwan）, Hang-Chin Lai (Taiwan), Denny H. Leung (Singapore), Chi-Kwong Li (USA), H. Nakazato (Japan), Chi-Kueng Ng (China), Yiu Tung Poon (USA) , Agnes Radl (Switzerland), A. Salemi (Iran), Ana Nata Santos (Portugal), Mau-Hsiang Shih (Taiwan), Raymond Nung-Sing Sze (USA), Wataru Takahashi (Japan), Bit-Shum Tam (Taiwan), Tin Yau Tam (USA), Ming-Cheng Tsai (Taiwan), Frank Uhlig (USA), Batzorig Undrakh (Mongolia), Hao-Wei Huang (USA), Kuo-Zhong Wang (Taiwan), Ya-Shu Wang (Taiwan), , J. Zemanek (Poland) , F. Zhang (USA), K. Zyczkowski (Poland).

Sponsors and Endorsers: National Sun Yat-sen University (NSYSU), Taiwan National Science Council (NSC), and the International Linear Algebra Society (ILAS)

Organizing Committee: Mao-Ting Chien 簡戊丁, Hwa-Long Gau 高華隆, Chi-Kwong Li 李志光, Ying-Fen Lin 林英芬, Ngai-Ching Wong 黃毅青, and Pei Yuan Wu 吳培元

The Eleventh Workshop on Numerical Ranges and Numerical Radii

第十一屆數值域與數值半徑研討會

Science Building 3001, NSYSU, Taiwan.

As of 2012/7/8

	Monday July 9	Tuesday July 10	Wednesday July 11	Thursday July 12
8:50-9:20am	**Registration/Opening**	Miroslav Fiedler	Tsuyoshi Ando	Jaroslav Zemanek
9:25-9:55	Man-Duen Choi	Fuzhen Zhang	Mau-Hsiang Shih	Natália Bebiano
10:00-10:30	Chi-Keung Ng	Hiroshi Nakazato	Wataru Takahashi	Hao-Wei Huang
	Tea/coffee/snacks			
11:00-11:30	Denny H. Leung	Undrakh Batzorig	Yiu Tung Poon	Tin Yau Tam
11:35-12:05	Ya-Shu Wang	Frank Uhlig	Nathaniel Johnston	Daeshik Choi
12:10-12:40	Jor-Ting Chan	John Holbrook	Pei Yuan Wu	Chi-Kwong Li
	Lunch			**Sightseeing/Boat tour (12:40 - right after the last talk)**
1:50-2:20pm	Karol Zyczkowski	Abbas Salemi	Tsang-Hai Kuo	
2:25-2:55	Raymond N-S Sze	Ana Nata Santos	Hwa-Long Gau	
	Tea/coffee/snacks			
3:25-3:55	Agnes Radl	Anne Greenbaum	Kuo-Zhong Wang	
4:00-4:30	Wai-Shun Cheung	David W. Kribs	Ming-Cheng Tsai	
	Tea/coffee/snacks	Ming-Hsiu Hsu (PhD defense, 4:30-6:30)	Tea/coffee/snacks	
4:45-5:15	Chang-Pao Chen		Chi-Tung Chang	
5:20-5:50	Mao-Ting Chien		Hang-Chin Lai	
6:00	**Group Photo**			
6:30	**Reception (in campus)**		**Concert/Banquet (Uni Resort Hotel)**	

1. **Registration/Opening: 8:50-9:20 am at venue; collecting registration (US$100) and tour (US$30).**
2. Group Photo will be taken at the bronze statue of Dr. Sun Yat-sen in the campus garden.
2. Reception will be held in the Chinese restaurant in the Student Union Building.
3. A Chinese traditional music concert performed by local school children is held before the banquet.
4. We will celebrate the 65th birthday of Professor Pei-Yuan Wu during the banquet. Prepare to speak or sing.

The Eleventh Workshop on Numerical Ranges and Numerical Radii
(WONRA2012)
第十一屆數值域與數值半徑研討會

Science Building 3001
Department of Applied Mathematics
National Sun Yat-sen University
Kaohsiung, Taiwan, R. O. C.
July 9–12, 2012.

as of July 8, 2012

Monday, July 9, 2012

08:50 – 09:20 Registration/Opening
Hong-Kun Xu (National Sun Yat-sen University, Taiwan)
Chi-Kwong Li (College of William and Mary, USA)

(Chair: Ngai-Ching Wong)

09:25 – 09:55 Man-Duen Choi (University of Toronto, Canada) (page 11)
The panorama of two by two complex matrices.

10:00 – 10:30 Chi-Keung Ng (Nankai University, China) (page 17)
A Murray-von Neumann type classification of C^*-algebras.

tea/coffee/snacks

(Chair: Hwa-Long Gau)

11:00 – 11:30 Denny H. Leung (National University of Singapore, Singapore) (page 16)
Linear and nonlinear disjointness preserving operators on function spaces.

11:35 – 12:05 Ya-Shu Wang (National Central University, Taiwan) (page 22)
Preservers on the Lipschitz functions.

12:10 – 12:40 Jor-Ting Chan (University of Hong Kong, Hong Kong) (page 8)
Linear preservers of the joint numerical radius.

Lunch

(Chair: Denny Leung)

13:50 – 14:20 Karol Zyczkowski (Jagiellonian University Cracow, Poland) (page 24)
Numerical shadow: a probability measure supported by the numerical range.

14:25 – 14:55 Raymond N-S Sze (The Hong Kong Polytechnic University, Hong Kong) (page 20)
The (p, k) matricial ranges and operator quantum error correction.

TEA/COFFEE/SNACKS

(Chair: Frank Uhlig)

15:25 – 15:55 Agnes Radl (Universitaet Bern, Switzerland) (page 18)
The numerical range of positive operators.

16:00 – 16:30 Wai-Shun Cheung (University of Hong Kong, Hong Kong) (page 10)
Elementary Proofs For Some Numerical Range Results.

TEA/COFFEE/SNACKS

(Chair: Tin Yau Tam)

16:45 – 17:15 Chang-Pao Chen (Hsuan Chuang Univrersity, Taiwan) (page 9)
The Muckenhoupt-type estimations for the best constants in multidimensional modular inequalities over spherical cones.

17:20 – 17:50 Mao-Ting Chien (Soochow University, Taiwan) (page 10)
Determinantal representation of trigonometric polynomials.

Group Photo taken at the bronze statue of Dr. Sun Yat-sen in campus garden (18:00 pm)

Reception at the Chinese Restaurant in the Student Union Building (18:30 pm)

Tuesday, July 10, 2012

(`Chair: Chi-Kwong Li`)

08:50 – 09:20 Miroslav Fiedler (Institute of Computer Science ASCR, Czech) (page 11)
Factorizable matrices.

09:25 – 09:55 Fuzhen Zhang (Nova Southeastern University, USA) (page 24)
Some inequalities of majorization type.

10:00 – 10:30 Hiroshi Nakazato (Hirosaki University, Japan) (page 17)
Numerical range associated with a closed orbit under a central force.

TEA/COFFEE/SNACKS

(`Chair: Fuzhen Zhang`)

11:00 – 11:30 Batzorig Undrakh (National University of Mongolia, Mongolia) (page 10)
On the numerical range of the weighted shift operators.

11:35 – 12:05 Frank Uhlig (Auburn University, USA) (page 21)
Fields of values for matrix factorizations and inner $O(n^2)$ approximations of the field of values.

12:10 – 12:40 John Holbrook (University of Guelph, Canada) (page 13)
Compressions of normal matrices.

Lunch

(Chair: Jor-Ting Chan)

13:50 – 14:20 Abbas Salemi (Shahid Bahonar University, Iran) (page 18)
GMRES and polynomial numerical hulls of matrices.

14:25 – 14:55 Ana Nata Santos (Polytechnic Institute of Tomar, Portugal) (page 19)
Remarks on the numerical range of banded biperiodic Toeplitz operators: theory and computer generation.

TEA/COFFEE/SNACKS

(Chair: Miroslav Fiedler)

15:25 – 15:55 Anne Greenbaum (University of Washington, USA) (page 12)
2*-spectral sets and similarity transformations with condition number* 2*.*

16:00 – 16:30 David W. Kribs (University of Guelph, Canada) (page 15)
Private quantum codes: introduction and connections with quantum error correction.

(Chair: Man-Duen Choi)

16:30 – 18:30 Ming-Hsiu Hsu (National Sun Yat-sen University, Taiwan) (page 14)
PhD Defense: "Isometries of real and complex Hilbert C-modules".*

Wednesday, July 11, 2012

(Chair: Jaroslav Zemanek)

08:50 – 09:20 Tsuyoshi Ando (Hokkaido University, Japan) (page 8)
Quadratic inequalities and factorizations of matrices.

09:25 – 09:55 Mau-Hsiang Shih (National Taiwan Normal University, Taiwan) (page 19)
Construction of Brain computing machines.

10:00 – 10:30 Wataru Takahashi (Tokyo Institute of Technology, Japan) (page 20)
Linear operators in nonlinear analysis and applications.

TEA/COFFEE/SNACKS

(Chair: Mau-Hsiang Shih)

11:00 – 11:30 Yiu Tung Poon (Iowa State University, USA) (page 18)
Generalized numerical ranges and quantum error correction.

11:35 – 12:05 Nathaniel Johnston (University of Guelph, Canada) (page 15)
Duality of entanglement norms.

12:10 – 12:40 Pei Yuan Wu (National Chiao Tung University, Taiwan) (page 23)
Diagonals and numerical ranges of finite matrices.

Lunch

Wu's afternoon

(Chair: Chang-Pao Chen)

13:50 – 14:20 Tsang-Hai Kuo (Chang Gung University, Taiwan) (page 15)
My acquaintance with Professor Pei-Yuan Wu.

14:25 – 14:55 Hwa-Long Gau (National Central University, Taiwan) (page 12)
Prof. Wu's journey through numerical ranges (Part I).

TEA/COFFEE/SNACKS

(Chair: Mao-Ting Chien)

15:25 – 15:55 Kuo-Zhong Wang (National Chiao Tung University, Taiwan) (page 22)
Prof. Wu's journey through numerical ranges (Part II).

16:00 – 16:30 Ming-Cheng Tsai (National Sun Yat-sen University, Taiwan) (page 21)
Prof. Wu's journey through numerical ranges (Part III).

TEA/COFFEE/SNACKS

(Chair: Yiu Tung Poon)

16:45 – 17:15 Chi-Tung Chang (National Chiao Tung University, Taiwan) (page 9)
Prof. Wu's journey through numerical ranges (Part IV).

17:20 – 17:50 Hang-Chin Lai (Chung Yuan Christian University, Taiwan) (page 15)
Overview on the Relationship Between Multiplier Operators and Invariant Operators.

Music Concert/Banquet in Uni Resort Hotel (18:30 pm)

Thursday, July 12, 2012

(Chair: Nathaniel Johnston)

08:50 – 09:20 Jaroslav Zemánek (Polish Academy of Sciences, Poland) (page 23)
Numerical range in complex analysis.

09:25 – 09:55 Natália Bebiano (University of Coimbra, Portugal) (page 8)
Numerical ranges of Toeplitz operators with matrix symbols.

10:00 – 10:30 Hao-Wei Huang (Indiana University-Bloomington, USA) (page 13)
Supports and regularity for measures in a free additive convolution semigroup.

TEA/COFFEE/SNACKS

(Chair: Pei Yuan Wu)

11:00 – 11:30 Tin Yau Tam (Auburn University, USA) (page 21)
Connectedness, Hessian and generalized numerical range.

11:35 – 12:05 Daeshik Choi (University of Washington, USA) (page 11)
Crouzeix's conjecture and Diagonally Perturbed Jordan blocks.

12:10 – 12:40 Chi-Kwong Li (College of William and Mary, USA) (page 16)
Optimizing quadratic forms of adjacency matrices, and numerical radii of weighted shifts.

Closing Remarks

A half day tour for local attractions

Abstracts

Quadratic inequalities and factorizations of matrices

Tsuyoshi Ando
Hokkaido University (Emeritus), Japan
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Abstract

For $0 \leq A, C \in M_n$ and $B \in M_n$, we consider two inequalities of Schwarz type:

$$\langle Ax|x\rangle \cdot \langle Cy|y\rangle \geq |\langle Bx|y\rangle|^2 \qquad (x, y \in \mathbb{C}^n), \tag{1}$$

and

$$\langle Ax|x\rangle \cdot \langle Cx|x\rangle \geq |\langle Bx|x\rangle|^2 \qquad (x \in \mathbb{C}^n). \tag{2}$$

When $A = C = I$, the inequalities (1) and (2) mean respectively (norm) $\|B\| \leq 1$ and (numerical radius) $w(B) \leq 1$.
It is well-known that the inequality (1) can be equivalently expressed by existence of a contraction $\|W\| \leq 1$ such that $B = A^{\frac{1}{2}} W C^{\frac{1}{2}}$.
In this talk we ask whether a similar expression can be established for the inequality (2).

Numerical ranges of Toeplitz operators with matrix symbols

Natália Bebiano
Department of Mathematics, University of Coimbra, Portugal
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Abstract

For Toeplitz operators acting on the Hardy space H^2 with definite or indefinite metric, the respective numerical ranges are investigated. Special attention is paid to the indefinite numerical range of banded 2 -Toeplitz operators, which is characterized by performing a reduction to the 2-dimensional underlying space. Classes of tridiagonal 2-Toeplitz operators with indefinite hyperbolical range are studied.

Linear Preservers of the Joint Numerical Radius

Jor-Ting Chan
Department of Mathematics, The University of Hong Kong, Hong Kong
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Abstract

For a complex Hilbert space H, let $B(H)$ denote the vector space of all bounded linear operators on H and $B(H)^n$ the product of n copies of $B(H)$. For $\mathbf{A} = (A_1, \ldots, A_n) \in B(H)^n$, the *joint numerical range* and the *joint numerical radius* of $\mathbf{A}$ are denoted and defined respectively by

$$W(\mathbf{A}) := \{(\langle A_1 x, x\rangle, \ldots, \langle A_n x, x\rangle) : x \in H \text{ and } \|x\| = 1\},$$

and

$$w(\mathbf{A}) := \sup\{\sqrt{|\lambda_1|^2 + \cdots + |\lambda_n|^2} : (\lambda_1, \ldots, \lambda_n) \in W(\mathbf{A})\}.$$

A linear mapping $T : B(H)^n \to B(H)^n$ is called a *preserver* of the joint numerical radius if $w(T(\mathbf{A})) = w(\mathbf{A})$ for every $\mathbf{A} \in B(H)^n$. Recently, Li and Poon obtained a complete description for such T when H is finite-dimensional. In this talk, we shall show that if T is surjective, the same description holds when H is infinite-dimensional. Linear preservers relating to the Davis-Wielandt shell will also be discussed. This is a joint work with Kong Chan.

Prof. Wu's Journey Through Numerical Ranges (Part IV) - Numerical Ranges and Geršgorin Discs

Chi-Tung Chang

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Abstract

I will introduce the academic contribution of Prof. Pei Yuan Wu about numerical ranges and Geršgorin discs:
For a complex matrix $A = [a_{ij}]_{i,j=1}^n$, let $W(A)$ be its numerical range, and let $G(A)$ be the convex hull of $\bigcup_{i=1}^n \{z \in \mathbb{C} : |z - a_{ii}| \le (\sum_{i \ne j}(|a_{ij}| + |a_{ji}|))/2\}$ and $G'(A) = \bigcap\{G(U^*AU) : U\, n\text{-by-}n \text{ unitary}\}$. It is known that $W(A)$ is always contained in $G(A)$ and hence in $G'(A)$. In this paper, we consider conditions for $W(A)$ to be equal to $G(A)$ or $G'(A)$. We show that if $W(A) = G'(A)$, then the boundary of $W(A)$ consists only of circular arcs and line segments. If, moreover, A is unitarily irreducible, then $W(A)$ is a circular disc. Complete characterizations of 2-by-2 and 3-by-3 matrices A for which $W(A) = G'(A)$ are obtained. We also give criteria for the equality of $W(A)$ and $G(A)$. In particular, such A's among the permutationally irreducible ones must have even sizes. We also characterize those A's with size 2 or 4 which satisfy $W(A) = G(A)$.

The Muckenhoupt-type estimations for the best constants in multidimensional modular inequalities over spherical cones

Chang-Pao Chen

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Abstract

In this paper, we establish the Muckenhoupt-type estimation for the best constant C associated with the following multidimensional modular inequality over a spherical cone:

$$\left(\int_E \left\{\Phi\left(\int_{\bar{S}_x} k(x,t)f(t)\,d\sigma(t)\right)\right\}^q d\mu\right)^{1/q} \le C\left(\int_E \{\Phi(f(x))\}^p\,d\nu\right)^{1/p},$$

where $f \in L^p_\Phi(d\nu)$ and $1 \le p, q \le \infty$. Similar results are also derived for the complementary integral operator. As a consequence, we give the n-dimensional weighted extensions of Levinson's modular inequality, extensions of Stepanov's and Heinig's results, generalizations of the Hardy-Knopp-type inequalities, and those for the Riemann-Liouville operator and theWeyl fractional operator. We also point out that our estimates are better than the known ones.
This is a joint work of Chang-Pao Chen, Jin-Wen Lan, and Dah-Chin Luor.

Elementary Proofs For Some Numerical Range Results

Wai Shun Cheung
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Abstract

From the earliest result of Anderson on the circular symmetry of numerical ranges, to the recent generalization by Wu, the original proofs usually make use of algebraic geometry techniques. We will give elementary proofs which require only simple properties of polynomials and continuous functions.

Determinantal representation of trigonometric polynomials

Mao-Ting Chien
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Abstract

Let A be an $n \times n$ matrix. The numerical range of A is defined as the set $W(A) = \{\xi^* T\xi : \xi \in \mathbf{C}^n, \xi^*\xi = 1\}$. A ternary homogeneous polynomial associated with A defined by $F_A(t,x,y) = \det(tI_n + xH + yK)$ is hyperbolic with respect to $(1,0,0)$, where $H = (A+A^*)/2$, $K = (A-A^*)/(2i)$. It is well known that $W(A)$ is the convex hull of the real affine part of the dual curve of the curve $F_A(t,x,y) = 0$. The Fiedler-Lax conjecture is recently affirmed, namely, for any real ternary hyperbolic form $F(t,x,y)$, there exist real symmetric matrices S_1 and S_2 such that $F(t,x,y) = \det(tI_n + xS_1 + yS_2)$. In this talk, we construct the existence of real symmetric matrices for the ternary hyperbolic forms induced by trigonometric polynomials using Bezoutian and Sylvester elimination methods.

Crouzeix's conjecture and Diagonally Perturbed Jordan blocks

Daeshik Choi

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Abstract

Crouzeix's conjectrue is that for any square matrix A and any polynomial p,

$$\|p(A)\| \leq 2 \max\{|p(z)| : z \in W(A)\};$$

where $W(A)$ is the field of values of A and $\|\cdot\|$ denotes the spectral norm. In this paper, we show the conjecture holds for the matrices of the form

$$\begin{pmatrix} \lambda & \alpha_1 & & \\ & \ddots & \ddots & \\ & & \ddots & \alpha_{n-1} \\ \alpha_n & & & \lambda \end{pmatrix},$$

where $\lambda \in \mathbb{C}$ and $\alpha = (\alpha_1, \ldots, \alpha_n) \in \mathbb{C}^n$.

This is a joint work with Anne Greenbaum (U. of Washington).

The panorama of two by two complex matrices

Man-Duen Choi

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Abstract

To attain to the heart of matrix theory, we need to admire the spectacular panorama of 2×2 matrices through the huge picture windows of numerical ranges. More precisely, we look into the down-to-earth information of the numerical ranges of 2×2 matrices, in the structure theory of dilations and positive linear maps, in connection with the recent surprising advances of quantum information. This talk agrees with my personal preference of using 2×2 matrices for theory (but 3×3 matrices for counter-examples).

Factorizable matrices

Miroslav Fiedler

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Abstract

In a series of papers, the author (partially with F. J. Hall) studied matrices obtained by multiplication of simpler matrices, each differing from the identity matrix by one diagonal block, with some restrictions. It turned out the resulting products have intriguing properties. All of them (with fixed factors) have the same spectrum independently of their ordering, they have certain zero - nonzero shapes, certain submatrices of lower rank, etc. The usual companion matrix of a polynomial belongs to such kind of matrices, and this fact led to the discovery of other simple companion matrices. In the talk, we intend to survey the known results and add a few recent observations.

Prof. Wu's Journey Through Numerical Ranges (Part I)

Hwa-Long Gau

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Abstract

In this talk, I will introduce the academic contribution of Prof. Pei Yuan Wu about numerical ranges on the following topics:

1. finite-dimensional compressions of shift;
2. companion matrices;
3. nilpotent operators;
4. quadratic operators;
5. nonnegative matrices;
6. Aluthge transform of operator;
7. the boundary of a numerical range;
8. higher-rank numerical ranges.

2-Spectral Sets and Similarity Transformations with Condition Number 2

Anne Greenbaum

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Abstract

Let A be an n by n matrix and let $W(A)$ denote its numerical range:

$$W(A) = \{\langle Aq, q\rangle : \|q\| = 1\}.$$

In *Bounds for analytical functions of matrices*, Integr. Equ. Oper. Theory 48 (2004), pp. 461-477, M. Crouzeix made the interesting conjecture that $W(A)$ is a 2-spectral set for A; that is, for any polynomial p,

$$\|p(A)\| \leq 2\|p\|_{W(A)},$$

where $\|\cdot\|$ denotes the operator 2-norm ($\|p(A)\| = \sup_{\|v\|_2=1} \|p(A)v\|_2$) and $\|\cdot\|_{W(A)}$ denotes the $\mathcal{L}^\infty$-norm on $W(A)$ ($\|p\|_{W(A)} = \sup_{z\in W(A)} |p(z)|$). An equivalent conjecture is that if g is a bijective holomorphic mapping from $W(A)$ onto the unit disk $\mathcal{D}$, then $\mathcal{D}$ is a 2-spectral set for $g(A)$; that is, for any polynomial p, $\|p(g(A))\| \leq 2\|p\|_{\mathcal{D}} \equiv 2\|p \circ g\|_{W(A)}$. This result would follow if it could be shown that $g(A)$ is similar to a contraction via a similarity transformation with condition number at most 2; that is, if $g(A)$ can be written in the form XCX^{-1}, where $\|C\| \leq 1$ and $\kappa(X) \equiv \|X\| \cdot \|X^{-1}\| \leq 2$, since von Neumann's inequality would then imply $\|p(g(A))\| = \|Xp(C)X^{-1}\| \leq \kappa(X)\|p(C)\| \leq 2\|p\|_{\mathcal{D}}$.
Numerical experiments suggest that while the numerical radius of $g(A)$ is usually greater than 1, if one looks for the matrix C of smallest norm satisfying $g(A) = XCX^{-1}$ for some X with $\kappa(X) \leq 2$, then the norm of C is indeed less than or equal to 1. We discuss some numerical observations and possible approaches to proving this.

Compressions of normal matrices

John Holbrook

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Abstract

There has been longstanding interest in the problem of characterizing normal compressions of normal matrices. Indeed, the Hermitian case is completely solved by the Cauchy interlacing theorem, and its converse (due to Fan and Pall). More recently, the theory of higher–rank numerical ranges has included the solution to the case of scalar compressions. Here we take some steps towards a similar treatment of the general case. We develop some natural necessary conditions on the eigenvalues as well as some convenient sufficient conditions, showing by a study of the 2x2 compressions of 4x4 normals that the necessary conditions are not sufficient. We also give a new proof of the Choi–Kribs–Zyczkowski conjecture for 2x2 compressions by means of a powerful extension of that result. The CKZ conjecture (theorem) for 2x2 compressions says that diag(a,a) is a compression of normal N if a lies in the intersection L of the Ck, where Ck denotes the convex hull of the eigenvalues of N with the kth eigenvalue omitted. We show that in fact diag(a,b) is a compression whenever a,b both lie in L. This talk is based on joint work with Nishan Mudalige and Rajesh Pereira.

Supports and regularity for measures in a free additive convolution semigroup

Hao-Wei Huang
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Abstract

Let μ be a Borel probability measure on $\mathbb{R}$ and $t > 1$. In this talk, complete descriptions of the supports of the free additive convolution power $\mu^{\boxplus t}$ will be given. More precisely, I will briefly introduce some important theorems, such as free central limit theorem, in free probability theory and then explain how the supports of the measures in the semigroup $\{\mu^{\boxplus t} : t > 1\}$ vary when t increases. Moreover, motivated by free central limit theorem I will give equivalent conditions so that the measure $\mu^{\boxplus t}$ has only one component in the support for sufficiently large t. An example of μ such that there are infinitely many components in the support of $\mu^{\boxplus t}$ for all $t > 1$ will be given as well.

Isometries of real and complex Hilbert C*-modules

Ming-Hsiu Hsu
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Abstract

Let A and B be real or complex C*-algebras. Let V and W be real or complex (right) Hilbert C*-modules over A and B, respectively. Let T be a bounded linear bijective map from V onto W. We show the following statements are equivalent.

(a) T is a unitary operator and a module map, i.e., there is a $*$-isomorphism $\alpha : A \to B$ such that

$$\langle Tx, Ty\rangle = \alpha(\langle x, y\rangle) \quad \text{and} \quad T(xa) = (Tx)\alpha(a),$$

for all x, y in V and a in A.

(b) T preserves TRO products, i.e.,

$$T(x\langle y, z\rangle) = Tx\langle Ty, Tz\rangle, \quad \forall x, y, z \in V;$$

(c) T is a 2-isometry;

(d) T is a complete isometry.

Moreover, if A and B are commutative, then these statements are hold automatically when T is a isometry. On the other hand, If V and W are complex Hilbert C*-modules over complex C*-algebras, then T is unitary if and only if it is a module map.

This talk is the defense of his PhD thesis of the speaker. Every guest is welcome to participate into the oral exam, and to raise questions and comments in the due course. But all but the members of the exam committee will be asked to leave the room after the talk during the discussion of the exam result.

Duality of Entanglement Norms

Nathaniel Johnston
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Abstract

We consider four norms on tensor product spaces and demonstrate duality relationships between them. We show that the product numerical radius is dual to the robustness of entanglement, and we similarly show that the $S(1)$-norm of "N. Johnston and D. W. Kribs. A Family of Norms With Applications in Quantum Information Theory. Journal of Mathematical Physics, 51:082202, 2010" is dual to the cross norm of "O. Rudolph. A separability criterion for density operators. J. Phys. A: Math. Gen., 33:3951-3955, 2000". We also investigate consequences of this duality.

Private quantum codes: introduction and connections with quantum error correction

David Kribs
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Abstract

This is an introductory and speculative talk on a topic in quantum information science that I've recently been investigating. Private quantum codes arise in quantum cryptography and quantum key distribution. In some sense they are complementary to quantum error correcting codes (and in important special cases this complementarity is made precise by the Stinespring dilation theorem), which themselves have motivated considerable recent work in the study of numerical ranges. However, whereas the theory of quantum error correction is very well developed mathematically, the same cannot be said for private quantum codes.

My acquaintance with Professor Pei-Yuan Wu

Tsang-Hai Kuo
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Overview on the Relationship Between Multiplier Operators and Invariant Operators

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Abstract

Let X and Y be Banach spaces, and A be a commutative Banach algebra. Suppose that X and Y are Banach A-module. The space of A-module homomorphisms from X to Y, denoted by $\mathrm{Hom}_A(X, Y)$, is called the space of multipliers from X to Y.
Let G be a locally compact Abelian group, $E(G, X)$ and $F(G, Y)$ be Banach valued spaces on G to X and Y, respectively. If a bounded linear operator $T : E(G, X) \longrightarrow F(G, Y)$ is translation invariant, we will characterize the relationship between the multiplier operators and the invariant operators in this talk.
When $A = L^1(G)$, the multiplier space and the invariant operator space are the same as $M(G)$.

(1) $\mathrm{Hom}_{L^1(G)}(L^1(G), L^1(G)) = (L^1(G), L^1(G)) \cong M(G)$.

(2) $\mathrm{Hom}_{L^1(G)}(L^1(G), F(G)) \cong (L^1(G), F(G)) \cong F(G)$,
if $F(G) = L^p(G)$, $1 \leq p < \infty$ or $F(G) = C_0(G)$.

Moreover, in Banach space valued function defined on G, we can characterize the relation as:

(3) $\mathrm{Hom}_{L^1(G,A)}(L^1(G, A), L^1(G, X)) \cong M(G, X)$.

(4) $\mathrm{Hom}_{L^1(G,A)}(L^1(G, A), L^p(G, X)) \cong L^p(G, X)$. for $1 < p < \infty$.

(5) and others.

Linear and nonlinear disjointness preserving operators on function spaces

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Abstract

We suggest a definition of "biseparating" for a nonlinear operator acting between (vector-valued) function spaces. Then we study representation of biseparating maps acting between spaces of vector-valued differentiable functions. Specializing to linear maps, we recover results of J. Araujo on biseparating maps on $C^p(X, E)$, $p < \infty$. We also obtain some results for the case $p = \infty$.

Optimizing quadratic forms of adjacency matrices, and numerical radii of weighted shifts

Chi-Kwong Li
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Abstract

We consider optimal arrangement (labeling) of given numbers $w_1 \geq \cdots \geq w_{n-1}$ as weights w_{ij} for the edges e_{ij} of a tree graph with n vertices so that the corresponding quadratic form

$$\sum w_{ij} x_i x_j$$

is maximum/minimum for any nonnegative vector $x = (x_1, \ldots, x_n)$ with entries arranging in descending order. The results are used to determine the optimal arrangement of weights to the unspecified entries of certain operators that give the maximum or minimum numerical radius.

Numerical range associated with a closed orbit under a central force

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Abstract

A closed orbit C under a central force is realized as the dual curve of the boundary generating curve of the numerical range of a matrix $A = H + iK$. In other words, C is expressed as $\det(I_n + xH + yK) = 0$ for some hermitian matrices H, K. This talk is based on joint works with Prof. Mao-Ting Chien of Soochow University.

A Murray-von Neumann type classification of C^*-algebras

Chi-Keung Ng

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Abstract

We define type $\mathfrak{A}$, type $\mathfrak{B}$, type $\mathfrak{C}$ as well as C^*-semi-finite C^*-algebras. It is shown that a von Neumann algebra is a type $\mathfrak{A}$, type $\mathfrak{B}$, type $\mathfrak{C}$ or C^*-semi-finite C^*-algebra if and only if it is, respectively, a type I, type II, type III or semi-finite von Neumann algebra. Any type I C^*-algebra is of type $\mathfrak{A}$ (actually, type $\mathfrak{A}$ coincides with the discreteness as defined by Peligrad and Zsidó), and any type II C^*-algebra (as defined by Cuntz and Pedersen) is of type $\mathfrak{B}$. Moreover, any type $\mathfrak{C}$ C^*-algebra is of type III (in the sense of Cuntz and Pedersen). Conversely, any purely infinite C^*-algebra (in the sense of Kirchberg and Rørdam) with real rank zero is of type $\mathfrak{C}$, and any separable purely infinite C^*-algebra with stable rank one is also of type $\mathfrak{C}$. We also prove that type $\mathfrak{A}$, type $\mathfrak{B}$, type $\mathfrak{C}$ and C^*-semi-finiteness are stable under taking hereditary C^*-subalgebras, multiplier algebras and strong Morita equivalence. Furthermore, any C^*-algebra A contains a largest type $\mathfrak{A}$ closed ideal $J_{\mathfrak{A}}$, a largest type $\mathfrak{B}$ closed ideal $J_{\mathfrak{B}}$, a largest type $\mathfrak{C}$ closed ideal $J_{\mathfrak{C}}$ as well as a largest C^*-semi-finite closed ideal $J_{\mathfrak{sf}}$. Among them, we have $J_{\mathfrak{A}} + J_{\mathfrak{B}}$ being an essential ideal of $J_{\mathfrak{sf}}$, and $J_{\mathfrak{A}} + J_{\mathfrak{B}} + J_{\mathfrak{C}}$ being an essential ideal of A. On the other hand, $A/J_{\mathfrak{C}}$ is always C^*-semi-finite, and if A is C^*-semi-finite, then $A/J_{\mathfrak{B}}$ is of type $\mathfrak{A}$. Finally, we show that these results hold if type $\mathfrak{A}$, type

$\mathfrak{B}$, type $\mathfrak{C}$ and C^*-semi-finiteness are replaced by discreteness, type II, type III and semi-finiteness (as defined by Cuntz and Pedersen), respectively. [It is a joint work with Ngai-Ching Wong]

Generalized numerical ranges and quantum error correction

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Abstract

For a noisy quantum channel, a quantum error correcting code exists if and only if the joint higher rank numerical ranges associated with the error operators of the channel is non-empty. In this talk, we discuss the geometric properties of the joint higher rank numerical ranges and their implications to quantum computing. It is shown that if the dimension of the underlying Hilbert space of the quantum states is sufficiently large, the joint higher rank numerical range of operators is always star-shaped and contains a non-empty convex subset. In case the operators are infinite dimensional, the joint infinite rank numerical range of the operators is a convex set lying in the star center of all joint higher rank numerical ranges, and is closely related to the joint essential numerical ranges of the operators. In addition, equivalent formulations of the join infinite rank numerical range are obtained. As by products, previous results on essential numerical range of operators are extended.

The numerical range of positive operators

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Abstract

Recently, the numerical range of positive matrices was studied. The authors obtained Perron-Frobenius type results for the numerical range. Many of the tools used there are also available for operators on infinite dimensional spaces. In this talk we try to generalise those results to the numerical range of positive operators on Hilbert lattices.

GMRES and polynomial numerical hulls of matrices

Abbas Salemi
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Abstract

In this talk by using the polynomial numerical hulls of matrices we study the problem of complete and partial stagnation of the generalized minimum residual (GMRES) method.

Remarks on the numerical range of banded biperiodic Toeplitz operators: theory and computer generation

Ana Nata Santos

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Abstract

Let M_n be the algebra of $n \times n$ complex matrices. A matrix $T_n = (t_{kj}) \in M_n$ is said to be a *biperiodic Toeplitz* matrix if $t_{k,j} := a_{k-j}$, for k odd, and $t_{k,j} := b_{k-j}$, for k even, $k, j = 1, \ldots, n$. If there exists an integer $m \in \mathbb{N}$, $m < n$, such that $a_{k-j} = 0$ and $b_{k-j} = 0$, for $|k - j| > m$, $k, j = 1, \ldots, n$, then T_n is said to be a *banded biperiodic Toeplitz matrix* with *bandwidth* $2m + 1$. Let H^2 be the Hardy space. Any infinite banded biperiodic Toeplitz matrix can be identified with an operator T acting on the $H^2 \times H^2$ space. In this talk we prove that the boundary of the numerical range, $W(T)$, of an infinite banded biperiodic Toeplitz operator coincides with the boundary of the convex-hull of a family of 2×2 matrices. As a consequence of this characterization, a Matlab program that accurately exhibits $W(T)$ is presented. Furthermore, the parametric equations of the boundary generating curves of $W(T)$ are deduced and the numerical range of biperiodic tridiagonal Toeplitz operators is study, identifying a class with an elliptical numerical range. These abstract results are illustrated by several examples. This talk is based on a joint work with Professors Natália Bebiano and J. P. da Providência from the University of Coimbra, Portugal.

Keywords: Numerical range, boundary generating curves, banded biperiodic Toeplitz operators, tridiagonal operators.

Construction of Brain Computing Machines

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Abstract

We wish to introduce a brain computing machine which can be described formally as a 4-tuple, $\texttt{BCM} = (\mathcal{N}, \mathcal{L}, \Pi, \tau)$, where $\mathcal{N}$ is an evolutionary neural network (with random connections), $\mathcal{L}$ is an adaptive plan which determines what plasticity operator is to be applied to modify network structure of $\mathcal{N}$, Π is an aggregation for merging two sequences of vectors of neuronal active states, and $\tau \geq 0$ is a time controller for descrambling outputs of neuronal activity patterns. The outputs of BCM are essentially characterized by the afference of sequential excitatory inputs, the plasticity of neural connections, and the dynamics of nonlinear dynamical systems of coupled neurons. Thus BCM formulates a complex, mathematical system with a highly plastic feature. Two plasticity operators

are derived from the measure of synchronous neural activity and the measure of self-sustaining neural activity, respectively. The plasticity operators lead to activity-dependent changes in neural connections, which meet the neurophysiological postulate of Hebbian synaptic plasticity. With the plasticity operators, we reveal a process of circulation breaking in neural network dynamics: the occurrence of a loop of neuronal active states leads to an activity-dependent change in neural connections, which feeds back to reinforce neurons to tend to break the circulation of neuronal active states in this loop. Circulation breaking in BCM aids in shaping the spatiotemporal patterns of neuronal activity dynamically and culminating in the construct of diverse input-output pairing adaptively. A schematic design of the brain-BCM interface is proposed for the transformation of cortical ensemble plasticity into the action of plasticity operators on BCM.
This is a joint work of Mau-Hsiang Shih and Feng-Sheng Tsai.

The (p, k) matricial ranges and operator quantum error correction

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Abstract

Motivated by operator quantum error correction, we consider the (p, k) matricial range of an $n \times n$ matrix A, which is the set of $p \times p$ complex matrices B such that $X^*AX = B \otimes I_k$ for some $n \times pk$ matrix X with $X^*X = I_{pk}$. In this talk, basic properties/results and open problems on the (p, k) matricial range will be presented.

This talk is based on a joint work with Y.T. Poon (Iowa State University) and C.K. Li (College of William & Mary).

Linear Operators in Nonlinear Analysis and Applications

Wataru Takahashi

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Abstract

In this talk, we first study nonlinear analytic methods for linear contractive mappings in Banach spaces and then we obtain some new weak and strong convergence theorems for linear or nonlinear operators in Banach spaces.

Connectedness, Hessian and generalized numerical range

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Abstract

A brief survey on some generalized numerical range associated with a semisimple Lie algebra is given. We give another proof of the convexity of a generalized numerical range associated with a compact Lie group via a connectedness result of Atiyah and a Hessian index result of Duistermaat, Kolk and Varadarajan.
It is a joint work with Xuhua Liu of Auburn University

Prof. Wu's Journey Through Numerical Ranges (Part III)

Ming-Cheng Tsai
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Abstract

In this talk, I will introduce the academic contribution of Prof. Pei Yuan Wu about numerical ranges on the following topics:

1. Weighted shift matrices;

2. Numerical radius inequality for contractions.

Fields of values for matrix factorizations and inner $O(n^2)$ approximations of the field of values

Frank Uhlig
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Abstract

This talk has three separate subjects on the field of values of a matrix:

The **first part** investigates relations between the field of values of a matrix A and the fields of values for standard matrix factorizations of A, such as LR, QR, polar etc and we formulate two conjectures.

The **second part** revisits earlier ideas of Marcus and Pesce from 1987 of generating matrix fields of values via compressions and ellipse point evaluations. This approach can theoretically cut the

cost of drawing the FOV boundary curve of a matrix $A_{n,n}$ by a factor of n.
But there are difficulties. (joint work with Haley Steger, MA Auburn, 2012)

Finally we show how to reduce the FOV boundary curve plotting cost by around 80 % by using few eigenanalyses in conjunction with 2 by 2 compression ellipses of A instead of only eigenanalyses.

On the numerical range of the weighted shift operators

Batzorig Undrakh
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Abstract

In this paper we obtain exact formula for $\det\left(tI_n - (Q_n + Q_n^*)\right)$. Also we find numerical ranges of Q_n and H_n for $n = 3, 4$ in a simple way.

Prof. Wu's Journey Through Numerical Ranges (Part II)

Kuo-Zhong Wang
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Abstract

In this talk, I will introduce the academic contribution of Prof. Pei Yuan Wu about numerical ranges on the following topics:

1. Crawford numbers of powers of a matrix;
2. Numerical ranges of weighted shifts;
3. Diagonals and numerical ranges of weighted shift matrices.

Preservers on the Lipschitz functions

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Abstract

Let X, Y be realcompact metric spaces and E, F be Banach spaces. A linear bijection T between the local Lipschitz function spaces $Lip_{loc}(X, E)$ and $Lip_{loc}(Y, F)$ is said to be a *zero-set containments preserver* if

$$z(f) \subset z(g) \Longleftrightarrow z(Tf) \subset z(Tg)$$

for all $f, g \in Lip_{loc}(X, E)$. We prove that the zero-set containments preservers are weighted composition operators $(Tf)(y) = J_y(f(\tau(y)))$, where $J_y : E \to F$ is a linear bijection and $\tau : Y \to X$ is a homeomorphism. Moreover, when the zero-set containments preservers are defined in other Lipschitz functions, we can derive more properties of the homeomorphism τ.

Diagonals and numerical ranges of finite matrices

Pei Yuan Wu

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Abstract

In this talk, we give a brief survey of our recent works, jointly with H.-L. Gau and K.-Z. Wang, on the relation between the diagonal entries of a compression and the numerical range of a finite matrix. To be more precise, we consider the maximum size of a compression of an n-by-n (n at least 2) matrix A for which all its diagonal entries are in the boundary of the numerical range $W(A)$ of A. Call this number $k(A)$. If A is the n-by-n nilpotent Jordan block, then it's not too difficult to show that $k(A)$ equals the ceiling of $n/2$. We then generalize this fact to the more general S_n-matrices. Another generalization concerns the class of weighted shift matrices. Here the situation is more interesting. We show that, in this case, $k(A)$ can be any integer between 2 and n, and we characterize those A with $k(A)$ equal to n.

Numerical range in complex analysis

Jaroslav Zemánek

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Abstract

In this joint work with Simeon Reich and David Shoikhet, we estimate the deviation of a holomorphic mapping in a Banach space from its linear approximation, the Fréchet derivative at a fixed point, in terms of their numerical ranges. This leads to several constructions of holomorphic retractions onto the fixed point set, and a generalization of Cartan's uniqueness theorem as a characterization of linearity. A number of examples and open questions will be mentioned.

Some inequalities of majorization type

Fuzhen Zhang
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Abstract

This talk is concerned with matrix inequalities of majorization type. We show some basic majorization inequalities of vectors then apply them to derive matrix inequalities.

Numerical shadow: a probability measure supported by the numerical range

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Abstract

For any operator X acting on an N-dimensional Hilbert space H_N we introduce its numerical shadow, which is a probability measure on the complex plane supported by the numerical range of X. The shadow of X at point z is defined as the probability that the inner product (Xu, u) is equal to z, where u stands for a normalized N-dimensional random complex vector. In the case of $N = 2$ the numerical shadow of a non-normal operator can be interpreted as a shadow of a hollow sphere projected on a plane. A similar interpretation is provided also for higher dimensions. For a hermitian X its numerical shadow forms a probability distribution on the real axis which is shown to be a one dimensional spline.
The notions of numerical range and numerical shadow can be extended for operators acting on a Hilbert space with a tensor product structure. Restricting the set of pure states to the set of product states or maximally entangled states we introduce restricted numerical range and restricted numerical shadow of an operator. Analyzing restricted shadows of operators of a fixed size $N_A \times N_B$ we analyze the geometry of sets of separable and maximally entangled states of composite quantum system.

中山大學 WONRA 2012 夏の旅

7 月 12 日 July 12, 2012

- 13:30 中山大學出發 NSYSU Departure
- 14:15~15:45 佛陀紀念館覽勝 Buddha Memorial Center Travel
- 16:15~17:00 蓮池潭風景區&左營舊城 Lotus Pond Scenic Area & Old Wall
- 17:30~18:15 香蕉碼頭餐廳用餐 Taste Banana Pier Restaurant Cuisine
- 18:15~18:30 漁人碼頭漫步 Walking Around The Fisherman`s Wharf
- 18:30 愛河遊船 Boat Tour on Love River
- 20:00 活動結束 Dismissed, free

  Kaohsiung International Airport

  Higt Speed Rail **Zuoying** Station

香蕉碼頭餐廳用餐海港景色級佳▲

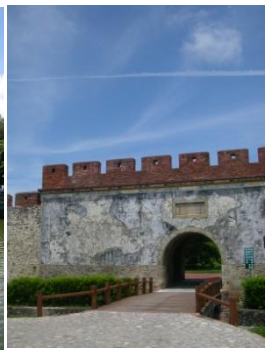
Good Harbor- View Around

The Banana Pier Restaurant

蓮池潭&佛陀紀念館▼

Lotus Pond & Buddha Memorial Center

Scenery



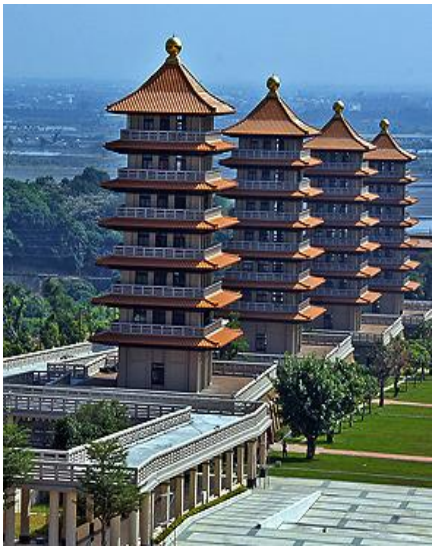
佛陀紀念館 Buddha Memorial Center Scenery▼

佛陀紀念館 Buddha Memorial Center Scenery▲

佛陀紀念館簡介 Buddha Memorial Center Introduction

位於高雄市大樹區，佔地約 100 公頃，於今年 2012 正式開館供普羅大眾參觀.
在館中保存著世界至寶的佛牙舍利子，值得到此一遊與瞻仰.
佛光大佛總高爲 108 公尺，堪稱目前最高的銅構坐佛像，雄偉而壯觀 ！
紀念館建築本身與格局融合了傳統，現代與國際元素，並深具佛法教化人心之重大意涵，是你我一生中必遊之聖地 ！

The Center was located at Kaohsiung Dashu Distict Area, founded and opening in 2012. Here keeps one Buddha` tooth-relic from the Tibet, worth your coming. This building incorporates both traditional and modern Chinese feature, as well as international elements. It will fulfill spiritual needs of the people and become aspiritual focal point for many in the world. The Buddha Memorial Center is a once-in-a-lifetime opportunity to must-visit holy palace !



蓮池潭風景區&左營舊城簡介

Lotus Pond Scenic Area & Old Wall Introduction

潭水位置在高雄市左營區的東側，潭長 1.4 公里，湖面佔地約 75 公頃，南臨龜山，北接半屏山，風光明媚，水平如鏡，名聞遐邇，遊客如織 ！

沿岸廟宇林立，香火鼎盛，視野遼闊，自古即是鳳山八景之一，西邊亭台樓閣林立，由南而北風景點分別有左營舊城、龍虎塔、五里亭、春秋閣、啓明堂、孔廟等景點，可謂古色古香，一派悠閒.

左營舊城保存完整，呈現當時 3 百餘年前的英勇氣度與威武神態，有懷古之情 ！

Lotus Pond is located east of Zuoying's old community and west of the North-South railway line. Guei Mountain lies to the south and Banping Mountain to the north. The

lake has an area of approximately 75 hectares. It also became a popular location to build temples. On the west side of the pond from north to south are the Confucius Temple, Ciming Temple, Spring and Autumn Pagodas, Wuli Arbor as well as the Dragon Tiger Tower. The solemn Confucius Templeis located further north. The bridges, pagodas, towers and bright colors make Lotus Pond a vibrant, renowned destination in Zuoying, especially for those interested in visiting temples. Lotus Pond is always shrouded in mist at dawn and dusk, making it very picturesque and mysterious.

前金國小國樂班中山大學音樂會

簡介：前金國小自民國 78 年奉教育局令設立音樂班，除了一般學業課程之外，另增加專業課程，包括主修〈國樂樂器〉，副修〈鋼琴、小提、大提、打擊〉，樂理、視唱聽寫、音樂欣賞……等等。在全國音樂比賽中，無論是個人的獨奏，或是團體的合奏項目，均有優秀表現，去年 4 月也赴新加坡音樂交流演出，頗受好評，在 99 學年度及 100 個學年度連續兩年的全國學生音樂比賽決賽當中，皆蟬連獲得國樂合奏與絲竹室內樂**雙料特優第一名的殊榮**，今天到場表演的是前金國小六年級剛畢業的小朋友。

Today, we'd like to welcome our performers, who are just graduated from the musical class. The Musical Class of Qian-jin Elementary School was established in 1989. Not only do the students major in traditional Chinese instrument, but also minor in many other instruments such as piano, violin, cello, percussions and also music theory. In many nation-wide musical competitions, solo performance and group performance both included, the students have achieved a great success. Last April, they were invited to participate in a musical performance in Singapore, where they also attained positive feedback. In year 2010 and 2011, they are announced as the winners of Chinese Orchestra and Sizhu Chamber Music.

※注意事項：

1.集合時間：101 年 7 月 11 日星期三晚上 5：30（節目開始約 6：00）
2.集合地點：統一渡假村(西子灣海景商務飯店)2F
(地址：高雄市鼓山區哨船街 14 號；電話：533-6676)
3.結束時間：約晚上 8：30 接回（晚宴約 6：30--8：00）
4.當天服裝：音樂班班服＋深色牛仔褲
5.請務必備妥樂器、調音器、譜架，包括：個人樂器、打擊棒、鈴鼓、譜架，請自行帶到現場。

節　目　單

節目順序	曲目	演出學生	備註
1	垃圾桶	蔡昀翰、余亭萱 陳琪英、黃意棻	打擊樂
2	查爾達斯舞曲	簡云開、彭婉瑄、 陳琪英、彭梓瑜 蔡孟芸	二胡齊奏
3	送我一枝玫瑰花	余亭萱、黃意棻 蔡昀翰、郭耘嘉	彈撥四重奏

4	春	蔡昀翰	揚琴獨奏
5	小天鵝	賴　煒、賴星翰	雙笛齊奏
6	我是一隻畫眉鳥	全　　體	小樂團合奏
7	祝妳幸福	全　　體	小樂團合奏
8	生日快樂	全　　體	小樂團合奏

參加學生：

吹管組：賴　煒、賴星翰、蔡孟芸、陳汶玲

拉弦組：簡云開、彭婉瑄、陳琪英、彭梓瑜

彈撥組：蔡昀翰、余亭萱、黃意棻、郭耘嘉

曲目解說

一、 *垃圾桶……打擊樂*

◎曲意：

曲中可見演奏者快速揮動鼓棒敲打桶身與桶面，棒棍、棒端也紛紛派上用場，搭配各種輕重緩急的打擊節奏，以及花俏的轉身走位，在一連串花式打擊秀中，結束精彩的打擊樂曲。

◎演出者：

由陳琪英、蔡昀翰、黃意棻、余亭萱 4 位同學擔任演出。

Tonight, the very first song presented is “Trash Can”, percussion music. In this song, the performers use drum sticks to hit the trash cans. By playing it very swiftly and rhythmically and with performers’ various moving, this song narrates marvelous percussion music. So now let us give them a big round of applause and enjoy!

二、 *查爾達斯•(匈牙利舞曲)*

The next performance is Erhu quintet. “Czardas” is a traditional Hungarian folk dance. The origin of the Csárdás can be traced back to the 18th century, used as a recruiting dance by the Hungarian army. The Csárdás is characterized by a variation in tempo: it starts out slowly (lassú) and ends in a very fast tempo (friss, literally "fresh"). The best-known instrumental csárdás is the composition by Vittorio Monti written for violin and piano. The song is full of the colorful characteristics of gypsy music style, which usually aims to spread happiness and wildness atmosphere but also includes soft and peaceful emotions at the same time.

曲意：

查爾達斯舞曲起源於吉普賽人的民間舞蹈，時間大概是在 15 世紀的 30 年代，在匈牙利廣為流行，到了 19 世紀的 50、60 年代成為匈牙利要的民間器樂體裁。樂曲開始時也有充滿激情的引，然後出深沉而略帶憂鬱的題，這就是“拉遜”的段落，它有小調色彩的抒情旋律，後來換成流暢而華麗的格調，都具有鮮明的匈牙利吉普賽音樂的特點。接著樂曲入快速而活潑的“弗里斯”，和上面那段“拉遜”形成強烈的對比，充滿歡快而奔放的氛圍。這段舞曲越來越熱烈，快速的句頻繁出現，使樂曲進入高潮。突然音樂平靜下來，慢慢地出溫柔而委婉的歌唱性題，這純樸而甜美的曲調以泛音回應，形成幽谷回聲的動人效果，快速的句再次現身，並用切分的節處理，將樂曲推向狂放的高潮從而結束全曲。

◎演出者：

由簡云開、彭婉瑄、陳琪英、彭梓瑜、蔡孟芸 5 位同學擔任演出。

三、*送我一枝玫瑰花……琵琶小合奏*

“Send Me a Rose” is a song of Pipa string Quartet. This song is adapted from Xin-jian folk song, in which narrates young ladies who fell in love. It is played with simple, smooth and fast tempo, spreading delightfulness and enthusiasm.

◎曲意：

新疆民歌改編，曲中描寫新疆少女熱戀中的情懷，以簡明而暢快的節奏，帶出愉快而熱烈的情愫。

◎演出者：

由蔡昀翰、黃意棻、余亭萱、郭耘嘉 4 位同學組合的彈撥四重奏。

四 、春……揚琴獨奏

Spring is song of Chinese (hammered) dulcimer solo, written by Hwan He and Wang Se. It is a song which portrays the beautiful scenery of spring rain, blossom and the variety of life. Our performer is Cai Jun-Han. Jun-Han participated in a nation-wide musical contest in Kaohsiung when he was in the fifth grade and in the first round, he was announced as the first place of dulcimer solo and the third place in the final round.

◎曲意：

黃河與王瑟合作的一首新作品，描寫春天雨露均霑，百花綻放，萬物生氣盎然之景象。

◎演出者：

由蔡昀翰小朋友擔任演出，蔡昀翰小朋友在五年級時，**參加全國學生音樂比賽高雄初賽，得到揚琴獨奏第一名的**成績，代表**參加全國決賽**時又**得到第三名**的好成績，相當不容易。

五、小天鵝……雙笛重奏

“Little Swan”, also named as “Dace of Little Swan,” is one of the best well-known scene in Swan Lake, which is composed by the famous musician, Tchaikovsky. Today this song is performed in Chinese flutes duet. Lai wei and Lai Xing-han are our performers today. They both attained the nation-wide musical contest last year and were announced as the second and the third place in flutes solo in the first round. Lai wei, as the representative, were announced as the second place in the final round.

◎曲意：

取材於柴可夫斯基天鵝湖中的四小天鵝舞曲配樂，改由雙笛重奏。

◎演出者：

由賴煒、賴星翰小朋友擔任演出，賴煒、賴星翰兩位小朋友**參加 100 學年度全國學生音樂比賽高雄初賽**時，分別**得到笛子獨奏第二名及第三名**的成績，而且賴煒小朋友還代表參加全國決賽時，也得到第二名的好成績，非常不容易。

Please contact for all new and changes in hotel reservations

聯 絡 人：Ms. Yun-Ting Hsieh /謝雲婷小姐

Email: hsiehyt@math.nsysu.edu.tw Tel：+886-75252000 ext. 3800 (Yun-Ting) or cell phone 0955122292

Fax: +886-7-5253809 (Applied Math Dept.), 5253818 (Wong)

WONRA2012 國際研討會住宿名單 中山大學校友會館 Alumni's House

No.	Last/First names 姓/名	Days to Stay 住宿時間		Room 房型	Total Nights
1.	Chien, Mao-Ting 簡茂丁	2012/7/8	2012/7/12	Single room	4
2.	Ng, Chi-Keung 吳志強	2012/7/8	2012/7/12	Single room	4
3.	Man-Duen Choi 蔡文瑞	2012/7/3	2012/7/13	Double room	10

Alumni's House, 6/F, Student Union Complex,
National Sun Yat-sen University, Kaohsiung.
http://www.nsysu.edu.tw
連絡電話：(07)5252000 ext.轉 5920 (Alumni's House)

WONRA2012 國際研討會住宿名單 海景境餐廳會館 Sunset Beach Hotel

No.	Last/First names 姓/名	Days to Stay 住宿時間		Room 房型	Total Nights
1.	Wu, Pei-Yau 吳培元	2012/7/8	2012/7/12	Double room	4 nights
2.	Uhlig, Frank (自費補差價)	2012/7/7	2012/7/13	Single room	4

WONRA2012 國際研討會住宿名單 西子灣海景商務飯店 **Uni-Resort Hotel**

No.	Last name 姓	First name 名	Days to Stay 住宿時間		Room 房型	Total Nights
1	Ando	Tsuyoshi	2012/7/8	2012/7/12	Single room	4
2	Bebiano	Natália	08/07/2012	13/07/2012	Single room	5
3	Chan	Jor-Ting	2012/7/8	2012/7/13	Single room	6
4	Chang	Chi-Tung	2012/7/8	2012/7/12	Single room	4
5	CHEUNG	WAI SHUN	2012/7/8	2012/7/13	Single room	5
6	Choi	Daeshik	09/07/2012	13/07/2012	Single room	4
7	Fiedler	Miroslav	2012/7/8	2012/7/12	Single room	4
8	Greenbaum	Anne	2012/7/8	2012/7/13	Single room	5
9	Holbrook	John	2012/7/8	2012/7/13	Single room	5
10	Johnston	Nathaniel	2012/7/8	2012/7/12	Single room	4
11	Kribs	David	2012/7/8	2012/7/13	Single room	5
12	Leung	Denny	2012/7/8	2012/7/12	Single room	4
13	Li	Chi-kwong	2012/7/8	2012/7/12	Single room	4
14	Molefe	Godfrey Bafana	2012/7/8	2012/7/13	Single room	5
15	Nakazato	Hiroshi	2012/July/8	2012/July/13	Single room	5
16	Nata Santos	Ana	08/07/2012	13/07/2012	Single room	5
17	Poon	Yiu	2012/7/9	2012/7/13	Double room	3
18	Radl	Agnes	2012/7/7	2012/7/13	Single room	6
19	Salemi	Abbas	2012/7/7	2012/07/14	Single room	7
20	Shih	Mau-Hsiang	2012/7/8	2012/7/12	Single room	4
21	Sze	Raymond Nung-Sing	2012/7/8	2012/7/12	Single room	4
22	Tam	Tin-Yau	2012/7/8	2012/7/13	Double room	5
23	Tam	Bit-Shun	2012/7/8	2012/7/12	Single room	4
24	Ugereh	Ufeitugo Theodore	2012/7/6	2012/7/30	Single room	Confirm? 自費 selfpay
25	Undrakh	Batzorig	2012/7/8	2012/7/13	Single room	5
26	Wang	Kuo-Zhong	2012/7/9	2012/7/12	Single room	3
27	Zemanek	Jaroslav	2012/7/8	2012/7/13	Single room	5
28	Zhang	Fuzhen	2012/7/8	2012/7/13	Single room	5
29	zyczkowski	Karol	2012/7/8	2012/7/13	Single room	5
30	Chen	chang-pao 陳璋泡	2012/7/8	2012/7/12	Double room	4 nights
31	Lai	Hang-Chin 賴漢卿	2012/7/9	2012/7/13	Single	4

Uni-Resort His-tzu-wan , No. 14, Shaochuan Street, Gushan Dist., Kaohsiung, Taiwan
(西子灣海景商務飯店： 地址/ 高雄市鼓山區哨船街 14 號 訂房/服務專線:(07)533-6676)
http://www.uni-resort.com.tw/eng.htm

高雄市鼓山區哨船街 14 號　　電話：(07)533-6676

交通工具(路線)

1.高鐵左營站→轉乘捷運/R16 左營站→經捷運/05 美麗島站→轉乘捷運/O1 西子灣站 1 號出口→出站轉搭高捷橘線

　公車→往西子灣方向→行經哨船頭公園下車。

2.高鐵站區之公車、客運路線，計有 4 線市區公車(2 線市公車、2 線捷運接駁路線)及 6 線公路客運，除捷運接駁路

　線尚未公告外，其餘 8 條路線分別由高雄市公車、高雄客運、中南客運、屏東客運、國光客運，以調整既有

　路線的方式行駛。

3.本市公車於高鐵(台鐵)左營站內、外，均設有公車動態資訊看板，告知市公車最新行車資訊，請多利用大眾

　運輸工具往返本飯店。

4.高鐵左營站區計程車臨時下車處，東側設於高鐵路，西側(台鐵)設於站前道路，上車處則集中設於立體停車

　場 2 樓，請依站內指引牌面行走，即可抵達上車處。

http://www.krtco.com.tw/en/StationGuide_map.aspx

O1 (Orange Line Station 1) = SIzihwan = National Sun Yat-sen University
http://www.krtco.com.tw/en/guide_o1.aspx

https://maps.google.com/maps?saddr=Sizihwan+station,+Gushan+District,+Kaohsiung+City,+Taiwan+804+(Sizihwan+station)&daddr=Unknown+road&hl=en&ll=22.621359,120.270553&spn=0.010993,0.014141&sll=22.622191,120.270145&sspn=0.010993,0.014141&geocode=FWgtWQEdbT4rBylfAYNVdQRuNDFxWhlyg7TCkg%3BFcQ7WQEdcR8rBw&dirflg=r&ttype=now&noexp=0&noal=0&sort=def&mra=ltm&t=m&z=16&start=0

click here

Exit information

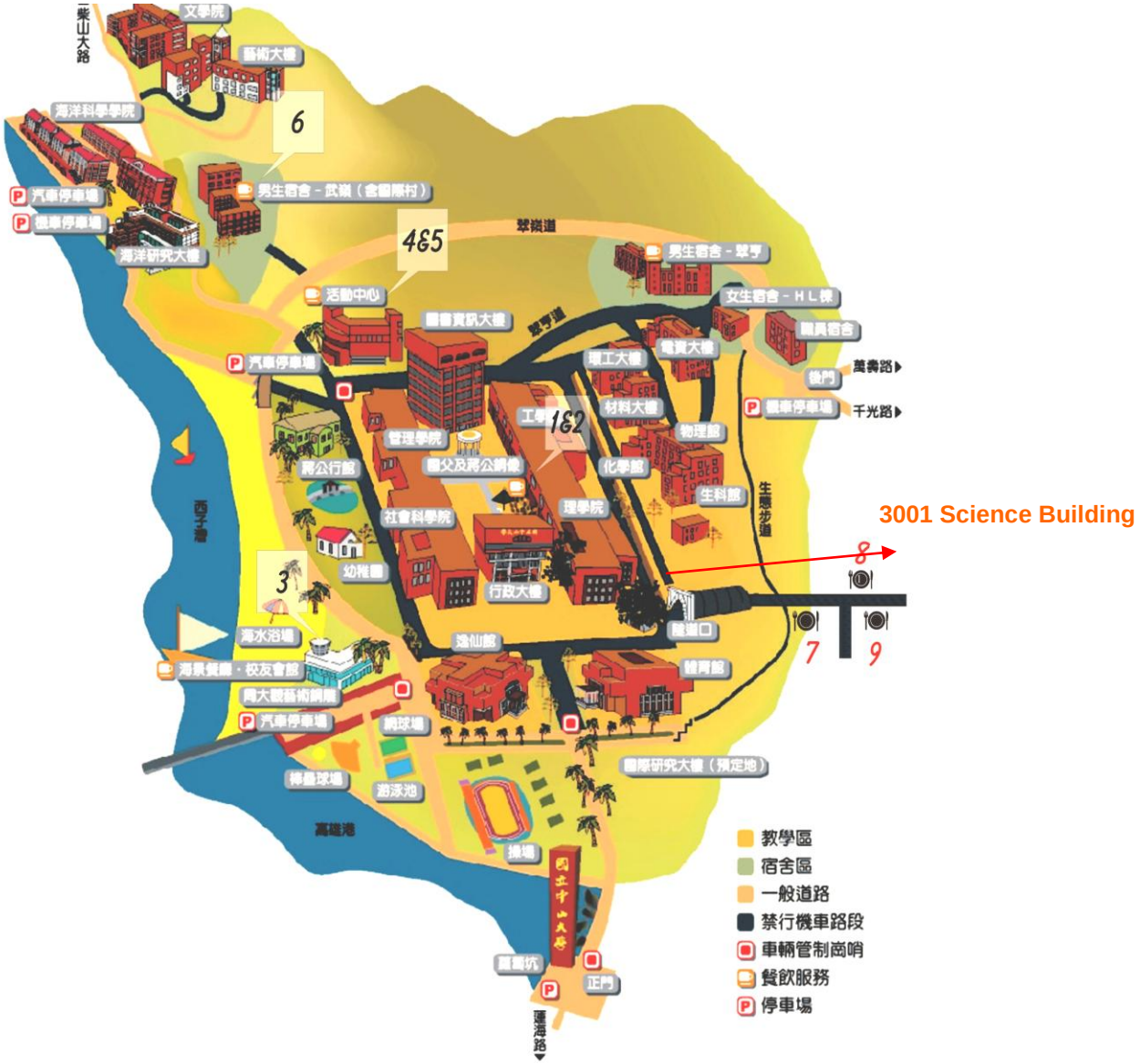
Exit No.	Direction	Facility
Exit 1	Gushan Ferry Gushan Post Office NSYSU	
Exit 2	Kaohusing Customs Fishermen's Wharf Banana Wharf	

Transportation

Kaohsiung International Airport ⟷ NSYSU/Hotels: You can take a taxi or metro. The taxi fare is roughly NTD400 and the metro fare is roughly NT50. You can show the following to the drivers if necessary. They will help you. If you want to take the metro, you need to transfer from Formosa Boulevard station (R10) to Slzihwan station (O1) which is much near to NSYSU/hotels. Then you can walk, or use the connecting shuttle bus Orange 1 with fare NT$D12 per person.

The shuttle bus O1 stops exactly in front of the Science Building.

If you choose to walk, when you arrive at the foot tunnel, you go through the tunnel and walk (10 min) to the venue at 3001, Science Building of NSYSU. The departmental office of Applied Math is at 4/F.



Guide from Metro Station O1 to Uni Resort Hotel

(In case of emergency, call the local mobile phones of

Ms. Yun-Ting Hsieh at +886-955122292, or

Mr. David Kuo at +886-928165272)

We provide pickup service only at the Kaohsiung International Airport (KHH) on July 8, 2012.

If you arrive on another day, please hire a taxi from the airport to the Uni-Resort Hotel (NT$300 fare by meter + 50 airport taxi surcharge). You can also use metro from Airport station R4 (R = Red line) to Sizihwan station O1 (O = Orange Line). See below.

If you arrive at the Taoyuan International Airport (nearby Taipei and coded TPE), take an airport shuttle bus to the Taoyuan high speed train station (Fair NT$40). A high speed train (last train departing at 10:16pm) takes 90 minute one way to Zuoying (= Kaohsiung), which is the terminal or last station. You can buy high speed train ticket by cash or credit card, and the fair is about NT$1400.

When you arrive at Zuoying (= Kaohsiung) high speed train station,

A. hire a taxi to Uni Resort Hotel. The fair is about NT$300; or
B. walk to the Zuoying Metro Station (inside the same building). It is the R16 station of Kaohsiung Metro. You need to transfer from Formosa Boulevard station R10 to **Sizihwan station O1** which is near to NSYSU/Uni Resort hotel.

Then you can walk, or use the connecting shuttle bus Orange 1 with fare NT$D12 per person. From the KMRT Sizihwan Station, you can take bus route **99** or **Orange 1** from exit 2, please prepare some coins before you leave the KMRT station (NT$12 per person) for this.

1. **By Bus:** You want to get off the bus at (哨船頭) Shaochuantau station and keep walking forward (1 minute) until you see the building below which is the Uni-Resort hotel.

Schedule for Bus Route Orange 1 from KMRT Station

06:30 07:00 07:30 08:00 08:20 08:40 09:00 09:20 09:45 10:10 10:40 11:10 11:40 12:10

12:40 13:10 13:40 14:10 14:40 15:10 15:30 15:50 16:10 16:25 16:40 16:55 17:10 17:25

17:40 17:55 18:10 18:40 19:10 19:40 20:10 20:40 21:10 21:40 22:10 23:03 23:33

Route 99 do have have a fixed schedule at KMRT Sizihwan station.

2. **On foot:** If you prefer walking, exit from exit 1 on Linhai 2nd Rd.

and walk toward the mountains until where you'll see a foot tunnel (through it to the the venue, NSYSU in 5 minutes).

Turn left when you reach this junction, do not enter the tunnel if you want to go to Uni-Resort hotel. Keep walking until you see the Uni Resort Hotel.

Show appropriate sentences to the taxi driver.

我要在西子灣海景商務飯店下車

(I want to get off at Uni-Resort Hotel.)

我要在中山大學校內海景餐廳飯店下車

(I want to get off at Sunset Beach Hotel.)

我要在中山大學校友會館下車

(I want to get off at the Alumni's House, NSYSU.)

中山大學隧道口下車

(I want to get off at the tunnel of NSYSU.)

中山大學行政大樓下車

(I want to get off at the Admin. Bldg of NSYSU.)

This is also the Science Building.

In case of need, please call Ms. Yun-Ting Hsieh /謝雲婷小姐 at

Tel：+886-75252000 ext. 3800, or cell phone 0955122292.

Please NOT to distribute this page to non participants of WONRA2012.

WIFI Networks

In the venue, you can use access the WIFI networks via

Account Name: mathv@math.nsysu.edu.tw,

Password: wireless

A few PC terminals will be provided in the library and tea room for guest usage.

International Calling Cards

You can make international/domestic phone calls via

Regular phone:
Dial (get a phone line access from hotel) 4128580 wait for the voice, or

Public phone:
Dial 0800-080-067, then

Press 2 (for English) →
Enter PIN number a or b + # →
009 + Country code + Area code + tel. no. + #
Wait and talk.

Two sets of PIN number, each can be used for several ten minutes.
a. 8168 3035 5403
b. 8115 0314 3433.