



# American-Chinese Connections via Mathematics: International Conference on Representation Theory (ICRT) V



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## Project Description and Rationale

Representation theory is a mathematical means for capturing and studying symmetries within all sorts of systems. This includes, but is not limited to, systems from biology, physics, economics, chemistry, game theory, engineering, finance, art, and politics, in addition to mathematics itself.

Starting a decade ago, a triennial conference in (sub)topics in representation theory was initiated, by a small group of Chinese and American mathematicians, in order to further open the door in China to this fundamental field of study. Since that time, much has changed, with Chinese mathematicians' rapid progress in this field mirroring China's emergence as a power on the world stage.

Still, few American-born mathematicians, especially young scholars, travel to China, and perhaps fewer Chinese-born mathematicians have the funding or opportunities to travel outside China. While one long-standing goal of the sequence of four ICRTs to date has been to increase opportunities for a community of (previously isolated) Chinese mathematicians, today it is arguably as important to young American mathematicians' futures to expose them to China's culture and to give them the chance to build relationships with their Chinese counterparts.

**This project seeks funding to support approximately 20 U.S. citizens, mostly young mathematicians, to travel to China for the fifth incarnation of the ICRT, to be held in the city of Xian in July of 2010.**



## Project Goals

### Main goals

- To apply in 2009 to the NSF for funding for approximately 20 U.S. mathematicians, mostly young mathematicians, to travel to China for the ICRT V.
- To facilitate the development of networks and professional relationships between Chinese and American mathematicians and mathematics students
- To introduce Chinese and American mathematicians to cutting-edge research in various subfields of representation theory

### Attendant subgoals

- To create working groups for specific project collaborations and planning, including possible joint Chinese-American summer school in representation theory
- To celebrate the career to date of one of the field's leaders and founding American participants, Brian Parshall, in honor of his 65th birthday.



## WMU Leadership Academy and this Project

Planning for this project, as part of membership in the 2008-2009 Leadership Academy at WMU, has included discussion and reflection upon not only the project description and its initial goals, but on the following issues:

Who needs to be "enlisted" for this project to be successful? And in what roles?

What is the best approach for enlisting the necessary people to make this project successful?

What might be negative or unproductive outcomes that should be considered, and how might they be avoided?

What are the cultures within and across which you as a leader will need to navigate to achieve your project's goals?



## More on Representation Theory

Representation theory has many forms, but many make use of matrices (linear transformations) to encode symmetries of systems embodied by abstract algebraic structures such as groups, associative algebras, Lie algebras. Due to its wide-ranging and powerful ability to reduce 'hard' problems to the study of 'easier' (linear) ones, representation theory is a core mathematical field. Some of its many applications include:

- Phylogenetic tree analysis in molecular and systems biology
- Robotics
- Motion picture animation
- Elementary particles and quantum mechanics
- Crystallography
- Coding theory
- Voting theory
- Telephone network designs
- Molecular vibration
- Vision
- Medical imaging
- Classification of finite groups and many other structures

## Past ICRTs

Under the leadership of Scientific Program Committee Chair Jianpan Wang (East China Normal University, Shanghai) and with the support of many others, past programs have been held in 2007 (Lhasa, Tibet), 2004 (Chengdu), 2001 (Kunming), 1998 (Shanghai). Speakers have included top leaders in the field of algebraic representation theory from all over the world.

