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*Representation theory: a brief introduction from the  $sl(n)$   
perspective*

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**Abstract:** Representation theory can be simply defined as the study of the ways a group acts on a vector space. A large piece of this process involves understanding weight spaces, particularly irreducible highest weight spaces. We will explore weight spaces of irreducible representations by looking at  $sl(n, \mathbf{C})$ ,  $U_q(sl(n))$  and  $U_q(\widehat{sl}(n))$ . As the structure of the space becomes more complicated we utilize different combinatorics to understand these irreducible, highest weight spaces.

Tuesday, March 24, 2009, 3:00 pm  
Mathematics and Science Center: W303

MATHEMATICS AND COMPUTER SCIENCE  
EMORY UNIVERSITY