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**WAI LING YEE**, University of Windsor, 401 Sunset Ave, Windsor, Ontario, N9B 3P4  
*Generalized Harish-Chandra Modules*

Two major tools in representation theory are:

- (1) restricting representations to compact subgroups since the representation theory of compact groups is well understood (this leads to the category of Harish-Chandra modules) and
- (2) exploiting joint eigenspaces of a Cartan (weight theory, which leads to Category  $\mathcal{O}$ ).

Motivated by combining the theory of compact groups with highest weight theory, we define mixed subgroups. The category of  $(\mathfrak{g}, M)$  modules, where  $M$  is a mixed subgroup, generalizes both Category  $\mathcal{O}$  and the category of Harish-Chandra modules: they can be recovered by choosing  $M$  appropriately. We classify the irreducibles in  $C(\mathfrak{g}, M)$ . We relate certain equivalence classes of mixed subgroup orbits on the flag variety and on block to such orbits on flag varieties and blocks for smaller generalized Harish-Chandra pairs and discuss the associated correspondence of representations.

This is joint work with Annegret Paul and Siddhartha Sahi.