## Phenomenology 2025 Symposium



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## Autonomous Model Building Neutrino Flavor Theories with Reinforcement Learning

Monday 19 May 2025 14:30 (15 minutes)

Model building in particle physics relies heavily on the intuition of theorists to select appropriate symmetry groups, particle content, and representation assignments. However, the space of viable models is vast. Exploring the space is usually computationally expensive. The challenge lies in the combinatorial complexity of symmetry and representation choices and the computational effort required to evaluate and compare a model's predictions with experimental data. In this talk, we present the development of an Autonomous Model Builder (AMBer), a reinforcement learning framework designed to search these spaces efficiently. We apply our framework to construct neutrino flavor models that reproduce the observed mass spectrum and mixing angles while maintaining minimal field content. We apply our agent to well-studied symmetry group spaces and discover new models within spaces that have not been previously explored.

## Mini Symposia (Invited Talks Only)

Plenary (Invited talks only)

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