

## Dark Tools



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# Hands-on LanHEP and CalcHEP: Efficient Implementation and Exploration of Dark Matter Models

*Monday 16 June 2025 15:00 (1 hour)*

Practical guidance will be given on how to implement and explore BSM dark matter models using LanHEP and CalcHEP.

Part I covers LanHEP, a tool for automatically generating Feynman rules from a Lagrangian. You'll learn how to produce model files in CalcHEP, CompHEP, and UFO formats, with a focus on CalcHEP output for use in micrOMEGAs. Examples will include the Inert Doublet Model and Fermionic Portal Vector Dark Matter models, walking through the full process from Lagrangian to simulation.

Part II focuses on CalcHEP for model exploration. You'll see how to inspect interactions, produce symbolic outputs, compute cross sections, simulate events, and perform multidimensional scans with CalcHEP routines and batch files. The session will demonstrate how to test the model, explore parameter space, and extract physical predictions efficiently using CalcHEP.

This session is for BSM model builders and phenomenologists looking for a hands-on, efficient workflow for model implementation, analysis, and seamless integration with micrOMEGAs.

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**Session Classification:** Hands-on session