Contribution ID: **16** Type: **not specified**

Paths Through the Dark: Comparing Approaches to Cosmological FOPTs

We explore the dynamics of cosmological phase transitions in a dark sector model featuring a dark photon associated with a U(1)D gauge symmetry. Our analysis focuses on two complementary approaches to construct the effective potential: an scale invariant model with the Coleman-Weinberg potential, both using the high-temperature approximation and a full numerical evaluation of the thermal integrals, and a dimensionally reduced 3D effective theory built with DRalgo, at both leading and next-to-leading order.

We investigate how these methods impact the characterization of the phase transition, particularly in the supercooled regime.

Our results show the importance of method choice when predicting observable signatures, and establish a benchmark for future studies of first-order phase transitions in models with weakly coupled dark sectors.

Primary authors: PUCHADES IBÁÑEZ, Cristina (JGU Mainz); Dr MADGE, Eric (IFT); Dr RAMIREZ-QUEZADA, Maura E. (JGU); SCHWALLER, Pedro (Johannes Gutenberg-Universität Mainz)