

Interpreting the WIMP Sibyl

Monday, 7 October 2019 15:30 (30 minutes)

Without any evidence of physics beyond the Standard Model from Accelerator Physics interpreting the data of Dark Matter search experiments appear as obscure and contradictory as the prophecies of the Sybil of Dodona, who predicted death and survival to a soldier in the same sentence. To address this problem we have no other choice than to adopt model-independent approaches. To help achieve this task we have developed WimPyDD, a flexible and customizable object-oriented code written in Python that incorporates in a modular way all the different required inputs, both experimental (data, efficiency, energy resolution, light/charge yield/quenching, estimated backgrounds) and theoretical (non-relativistic couplings, velocity distribution, form factors, kinematics) to analyze direct detection data in virtually any WIMP scenario. WimPyDD will be made public in the near future and has already been successfully tested in several publications.

In my talk I will show that, as in the case of the ancient Sybil answer, also WIMP direct data can have multiple interpretations. For instance, if direct detection data is analyzed in terms of the most general non-relativistic WIMP-nucleon interaction allowed by Galilean invariance and relaxing the standard assumptions about the dark halo velocity distribution the DAMA modulation effect turns out to be still allowed by the constraints of other experiments, while the sensitivity of apparently less competitive experiments becomes essential in covering some regions of the parameter space. We will need to analyze future data in the same open way if we want to be prepared for the unexpected.

Presenter: SCOPEL, Stefano (Sogang University)

Session Classification: Session 2