

Fundamental dark matter physics with strong gravitational lenses

The properties of dark matter halos and subhalos on scales below 10^9 solar masses depend on the formation mechanism, mass, and possible interactions of the dark matter particle. As such, inferences of the halo mass function and the internal structure of dark halos on these scales can be interpreted in the context of fundamental dark matter physics. I will discuss how effects such as free-streaming in warm dark matter, gravothermal catastrophe in self-interacting dark matter, and quantum wave interference in ultra-light dark matter impact the relative magnifications among images in quadruply-imaged quasars. I will then present recent constraints on these dark matter models using the existing sample of quad lenses.

Author: GILMAN, Daniel

Presenter: GILMAN, Daniel

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