

# Probing the relaxed relaxion with luminosity & S1 and S2

*Thursday 25 June 2020 10:00 (1 hour)*

**Zoom meeting:** <https://cern.zoom.us/j/7930190483> (password: see email)

**Format:** 40 minutes talk + 20 min discussion

**Virtual Axion Institute:** The discussion on this talk can be continued in Gilad's virtual guest office.  
<https://mattermost.web.cern.ch/axions/channels/gilad-perez>

**Abstract:** Cosmological relaxation of the electroweak scale is an attractive scenario addressing the gauge hierarchy problem. Its main actor, the relaxion, is a light spin-zero field which dynamically relaxes the Higgs mass with respect to its natural large value. We show that the relaxion is generically stabilized at a special position in the field space, which leads to suppression of its mass and potentially unnatural values for the model's effective low-energy couplings. In particular, we find that the relaxion mixing with the Higgs can be several orders of magnitude above its naive naturalness bound. Low energy observers may thus find the relaxion theory being fine-tuned although the relaxion scenario itself is constructed in a technically natural way. More generally, we identify the lower and upper bounds on the mixing angle. We examine the experimental implications of the above observations at the luminosity and solar-direct-detection frontiers.

**Presenter:** Prof. PEREZ, Gilad (Weizmann)

**Session Classification:** Naturalness