

## ICTS Seminar

- Title : New theoretical and experimental bounds on relaxation models
- Speaker : Rick Sandeepan Gupta, Weizmann Institute of Science, Israel
- Date : Wednesday, September 28, 2016
- Time : 3:00 pm
- Venue : Nambu Room, ICTS Campus, Bangalore
- Abstract : We consider the recently proposed cosmological relaxation mechanism where the hierarchy problem is ameliorated, and the electroweak scale is dynamically selected by a slowly rolling axion field. We argue that, in its simplest form, the construction breaks a gauge symmetry that always exists for pseudo-Nambu-Goldstone bosons (in particular the axion). An equivalent statement is that for a PNGB of period  $2\pi f$  all terms in its potential must have this periodicity and the non-periodic rolling potential of the relaxation breaks this requirement. We also consider multi-axion models proposed to address this issue and discuss a new bound on the number of axions in these models, which in turn puts a bound on the cut-off. Apart from this we derive experimental bounds on the relaxation parameter space from high intensity lab probes, cosmological late decays and astrophysics. Together these new theoretical and experimental bounds put a bound on the cut-off in the 10-1000 TeV range and suggest that in the region safest from these constraints the relaxation mass is likely to be within a KeV and a MeV.

Based on:

- 1) RSG, Komargodski, Perez and Ubalde (arXiv:1509.00047)
- 2) Flacke, Frugiuele, Fuchs, RSG, and Perez (arXiv:1609.XXXXX)