Seminar: "Geometry&Physics@DFT"

Location: seminar room DFT (IFIN-HH),
(http://events.theory.nipne.ro/gap/index.php/seminar)

Date: Wednesday, 8 January 2014, 12 am

Title: **On naturalness in supersymmetric theories**

Speaker: **Dr. Dumitru M. GHILENCEA**

Abstract: "Unlike the Standard Model, TeV-scale supersymmetry solves the hierarchy (naturalness) problem by fixing the electroweak (EW) scale v at the quantum level and predicts that v is function of the SUSY UV parameters (γ_α). The success of solving this problem is quantified by the EW fine-tuning concept for which there is however no widely accepted, model-independent definition and bound beyond which a model is not 'natural' anymore. It is shown that if one insists on fixing the EW scale $v = v(\gamma_\alpha)$ to its numerical value, as motivated by SUSY, the current likelihood to fit the EW data is suppressed by an additional factor that can only be interpreted as a *model-independent* fine-tuning measure (Δ) that emerges automatically from this condition. The condition of a good fit then provides a universal bound: $\Delta \leq \exp(\text{d.o.f.}/2)$, (d.o.f.= number of the degrees of freedom). The value of Δ in the current SUSY models consistent with the Higgs mass value is then computed, to examine if this bound is respected. A general approach shows that the covariance matrix of a model encodes all the information about the EW fine tuning provided that $v = v(\gamma_\alpha)$ and is therefore more fundamental than Δ."