Projects for "Tools in HEP" Lecture course

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Project 1: "Derive Constraints on g_{Hgg} coupling using LHC data"

Reference: "Constraining anomalous Higgs interactions" by Tyler Corbett, O.J.P. Eboli, J. Gonzalez-Fraile , M.C. Gonzalez-Garcia Phys.Rev. D86 (2012) 075013, arXiv:1207.1344

1. Using LanHEP implement operators relevant to anomalous g_{Hgg} coupling (see Eq.2,3)
2. Import model into CalcHEP
3. Evaluate CS of the Higgs production versus g_{Hgg}
4. Using latest LHD data on Higgs boson search find the limit on g_{Hgg} coupling at 95% CL assuming that other anomalous couplings vanish
5. Estimate limit on g_{Hgg} coupling using your own simulation of the signal and background for two photon signal from the Higgs boson decay
    a) *Upload model to HEPMDB*
    b) *Create batch file for two photon Higgs signal and respective backgrounds*
    c) *Using CalcHEP at HEPMDB, generate LHE events and ntuples for signal and background processes*
    d) *Using PAW plot invariant two-photon mass signal vs BG and estimate signal significance under the peak, taking into account detector mass resolution*
    e) *Estimate limit on g_{Hgg} coupling at 95% CL*