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Scalable CaloTracker (SCT) proposal for universal particle detector from zero till practically infinite energies

After discovery of Higgs-boson the particle physicist community should turn its attention for new challenges which could be directed toward ultra high energies. The hope in new accelerator technologies is greatly enhanced by invention of the laser driven plasma wake field methods which can produce beams with PeV (10¹⁵ eV) energy at some future time. For comparison on the expected time scale, one can mention that LHC was conceived in 1984 and will reach full energy hopefully in 2014. It is an interesting question what type of detector system would be applicable in this energy range for fixed target and collider arrangements.

Here we should like to present a new concept which is radically different from the present onion shell design (vertex pixel, tracker, EM-calorimeter, hadron calorimeter and muon detector). This new system would have a completely homogenous structure built from standard elements in a scalable way serving at the same time as very fine resolution TRACKER and a full absorption CALORIMETER with full 4 π coverage for both charged and neutral particles with the usual exception of penetrating neutrinos. Though one is not expecting accelerators with PeV beams before 2050, one can test the SCT (Scalable CaloTracker) detector principle at lower energies due to its modular scalable structure. The key element is a massively parallel information system which can process the complete shower development on track-by-track base on adaptive granulation levels.

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