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Subject: **RE: Meeting on CLIC detector benchmarks: 1400 (CERN) Monday 19th July**
Date: July 15, 2010 12:39:08 PM GMT+02:00
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Dear all,

here is a list of processes I think would be useful to adopt (at least in part) as benchmarks both to highlight the CLIC physics potential at 3 TeV and test the detector/accelerator parameters. They are sorted by final state. Several of these are already being studied for specific parameters.

regards, Marco

leptonic final states

$e^+e^- \rightarrow \tilde{\mu}_R \tilde{\mu}_R \rightarrow \mu \mu \chi_{0,1} \chi_{0,1}$ for a DM motivated cMSSM point with slepton masses of ~ 1 TeV (such as point K' of Eur.Phys.J.C33:273-296,2004)

$e^+e^- \rightarrow \tilde{e}_R \tilde{e}_R, \tilde{e}_L \tilde{e}_L, \tilde{e}_L \tilde{e}_R \rightarrow e e \chi_{0,1} \chi_{0,1}$ for same point

(energy/momentum resolution, luminosity spectrum, use of polarisation to separate eL and eR)

$e^+e^- \rightarrow \tilde{\tau}_1 \tilde{\tau}_1$ as a function of Δ_M (tau tagging, soft final states)

$e^+e^- \rightarrow \nu \nu H \rightarrow \nu \nu \mu \mu$ for SM $M_H = 120 - 160$ GeV (momentum resolution, fwd region)

quark final states

b, t jets

$e^+e^- \rightarrow H^0 A^0 \rightarrow bbbb$ for DM motivated cMSSM point in high $\tan\beta$ funnel region with $M_A \sim 1.0-1.2$ TeV (such as point K' above).
(4 jets, energy/mass resolution w/ kinematic fit, hard jets, b-tag requirements, time stamping requirements from $\gamma\gamma \rightarrow$ hadrons)

$e^+e^- \rightarrow \nu\nu H \rightarrow \nu\nu bb$ for SM $M_H = 170-200$ GeV
(b-tag, di-jet mass in fwd region, soft jets)

$e^+e^- \rightarrow bb, tt$ in SM ($\sigma_{qq}, A_{FB}, A_{LR}$)
(b-tag, hard jets, vertex charge, top reconstruction)

$e^+e^- \rightarrow H^+H^- \rightarrow tbtb$ for same point as HA, high $\tan\beta$ with $M_{H^\pm} \sim 1.0 - 1.2$ TeV
(top tagging, multi parton final state reconstruction, b-tagging in complex hadronic environment)

gauge boson final states

$e^+e^- \rightarrow \chi^+_{-1} \chi^-_{-1} \rightarrow W^+ \chi^0 E_{\text{miss}}$

$e^+e^- \rightarrow \chi^+_{-2} \chi^-_{-2}$

$e^+e^- \rightarrow$ inclusive charginos and neutralinos $\rightarrow W/Z/h$ for cMSSM with heavy squark

and sleptons leaving decays to gauge bosons as dominant channel.
(di-jet energy/mass resolution, reconstruction of kinematic edges in unconstrained hadronic final states)