# Question

- Describe the physics reach at luminosities of 2, 5 and 10 $fb^{-1}$ for top properties, W properties and searches.

| One experiment | 2 $fb^{-1}$ | 5 $fb^{-1}$ | 10 $fb^{-1}$ |
|---|---|---|---|
| # top events<br>≥3 jets + 1b-tag<br>≥4 jets + 2b-tags | <br>1000<br>240 | <br>2500<br>600 | <br>5000<br>1200 |
| Top mass:<br>Lepton + jets<br>Dileptons | <br>2.7 GeV<br>2.8 GeV | <br>2.2 GeV<br>2.2 GeV | <br>1.6 GeV<br>1.6 GeV |
| Single top<br>cross section (s / t)<br>$\|V_{tb}\|$ (s / t channel) | <br>21% / 12%<br>12% / 10% | <br>13% / 8%<br>8% / 9% | <br>9% / 5%<br>6% / 8% |
| Spin ½ vs. Spin 0 | $2\sigma$ | $3\sigma$ | $4.5\sigma$ |
| Rare decays $t \to c\gamma$<br>$t \to cZ$ | $< 7.5 \times 10^{-3}$<br>$< 4 \times 10^{-2}$ | $< 3 \times 10^{-3}$<br>$< 1.5 \times 10^{-2}$ | $< 1.5 \times 10^{-3}$<br>$< 7.5 \times 10^{-3}$ |
| W mass:<br>transverse mass<br>W/Z ratio method | <br>27 MeV<br>44 MeV | <br>22 MeV<br>28 MeV | <br>19 MeV<br>20 MeV |
| W width (direct) | 32 MeV | 24 MeV | 18 MeV |
| $\sin^2\theta_W^{eff}$ (from $A_{FB}$ ) | 0.0007 | 0.00042 | 0.00028 |

| One Experiment | 2 $fb^{-1}$ | 5 $fb^{-1}$ | 10 $fb^{-1}$ |
|---|---|---|---|
| # high $p_T$ jets > 400 GeV | 1300 | 3300 | 6600 |
| Gluino mass | 400 GeV | ~ 450 GeV? | ~ 500 GeV? |
| Trileptons $m_{1/2}$ reach<br>$\tan\beta = 5$, $m_0$ small<br>$\tan\beta = 5$, $m_0$ large<br>$\tan\beta = 35$, $m_0$ large | <br>$m_{1/2} \sim 220$ GeV<br>--<br>$m_{1/2} \sim 120$ GeV | <br>$m_{1/2} \sim 235$ GeV<br>$m_{1/2} \sim 140$ GeV<br>$m_{1/2} \sim 145$ GeV | <br>$m_{1/2} \sim 250$ GeV<br>$m_{1/2} \sim 160$ GeV<br>$m_{1/2} \sim 170$ GeV |
| GMSB $\gamma\gamma + ME_T$ chargino mass | 325 GeV | 345 GeV | 370 GeV |
| SUSY Higgs + bb reach in $\tan\beta$ for $m_A = 150$ GeV | $\tan\beta > 45$ | $\tan\beta > 35$ | $\tan\beta > 27$ |
| Topcolor $Z' \rightarrow tt$ | mass < 580 GeV | 640 GeV | 720 GeV |
| $Z' \rightarrow$ dijets | mass < 560 GeV | 610 GeV | 650 GeV |
| $Z' \rightarrow$ dileptons | mass < 1 TeV | 1.15 TeV | 1.3 TeV |

Sources:

- Private communications from DO and CDF collaborators
- CDF Run II TDR
- Precision Electroweak from Snowmass '01: hep-ph/0111217
- Meenakshi Narain presentation at the Top Thinkshop (at http://fnth37.fnal.gov/run2.html)
- Single top, Stelzer et al. hep-ph/9807340
- Higgs and SUSY, Run II Workshops http://fnth37.fnal.gov/run2.html
- Exotics (Z' etc.) from Cheung and Harris: hep-ph/9610382

Note: The numbers in these tables come from interpolations and from reading off plots. Any errors are mine.

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