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SDC
SOLENOIDAL DETECTOR NOTES

ACCUMULATED LUMINOSITY DESIGN GOAL FOR THE SDC DETECTOR

M. Gilchriese

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Accumulated Luminosity Design Goal for the SDC Detector

The SDC detector will likely operate, with suitable upgrades, for the useful lifetime of the SSC. The cost and installation time of most of the calorimetry will make a major upgrade unlikely, except perhaps once during the lifetime of the SDC detector. Minor upgrades and repairs, of course, will be possible more often and one can imagine replacing parts or all of the endcap calorimeters or forward calorimeters, perhaps once per decade.

To evaluate candidate calorimeter technologies it is useful to have some idea of the accumulated luminosity that might be expected during the lifetime of the detector. I have made some guesses as to the average luminosity during a year, the running time (taken as 10^7 seconds per calendar year) and the time-evolution of the average luminosity over years of operation.

The SSC design luminosity is 10^{33} . The ultimate luminosity is not precisely known but may reach 2×10^{34} or more after some years of operation.¹ How the luminosity will evolve with time (that is over a period of years) is even less well known. I have made three assumptions about this time evolution to calculate representative values of the accumulated luminosity. These I call (1) more aggressive evolution, (2) aggressive and (3) less aggressive. These are shown on the next page.

What's the conclusion? If the initial calorimetry, or most of it, is to operate for some years into the regime of 10^{34} , then an accumulated luminosity criterion of about 100×10^{40} is a reasonable value. My suggestion is that we adopt an integrated luminosity of 10^{42} in order to evaluate calorimeter technologies for those parts of the system that are very unlikely to be replaced.

¹ See the SSC Site-Specific Conceptual Design Report, May 1990.

