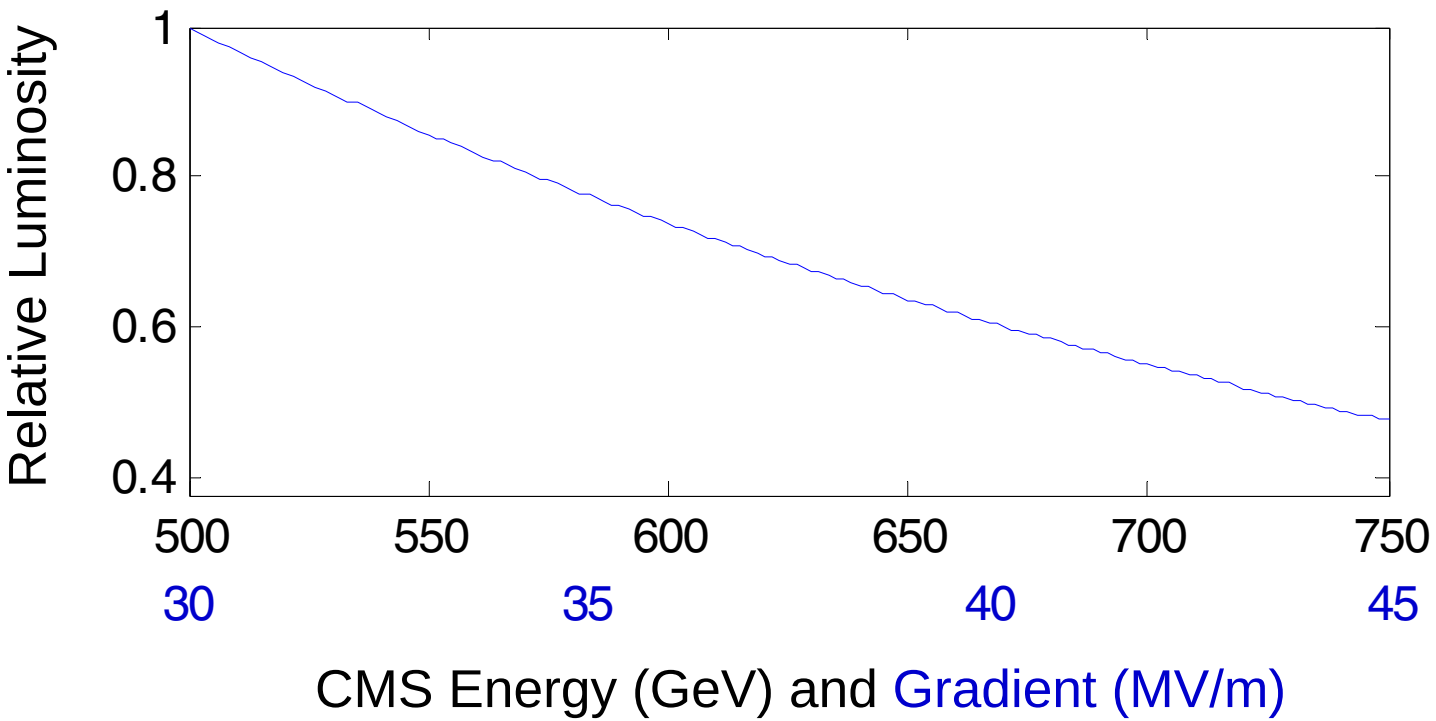
Gradient – Global View

- Minimize Cost
  - Minimum capital cost about 40 MV/m
    - 1 % TPC increase at 35 and 45 MV/m
    - 4 % TPC increase at 30 MV/m
  - However, AC-to-Beam efficiency decreases from 17.0% at 28 MV/m to 15.3% at 35 MV/m.
- Provide Extended Physics Reach
  - Choose gradient somewhat lower than thought achievable so higher energies are reachable at lower beam current (~ luminosity).
  - Use highest gradient cavities available at time of machine construction.

Practical Choice

- Design for 30 MV/m
- If decrease current by reducing number of bunches, achieve the following energy reach.



- Note that luminosity reduction plot does not include the effect of emittance reduction from adiabatic damping.
- This strategy decouples the risk associated with achieving higher gradients from the costing process while allowing future improvements to be incorporated.
- However need to choose cavity shape and iris size (discussed later – 60 mm diameter would probably be OK from a wakefield perspective and would reduce cooling requirements by 14% and save 50 M$ in cryoplant costs).