

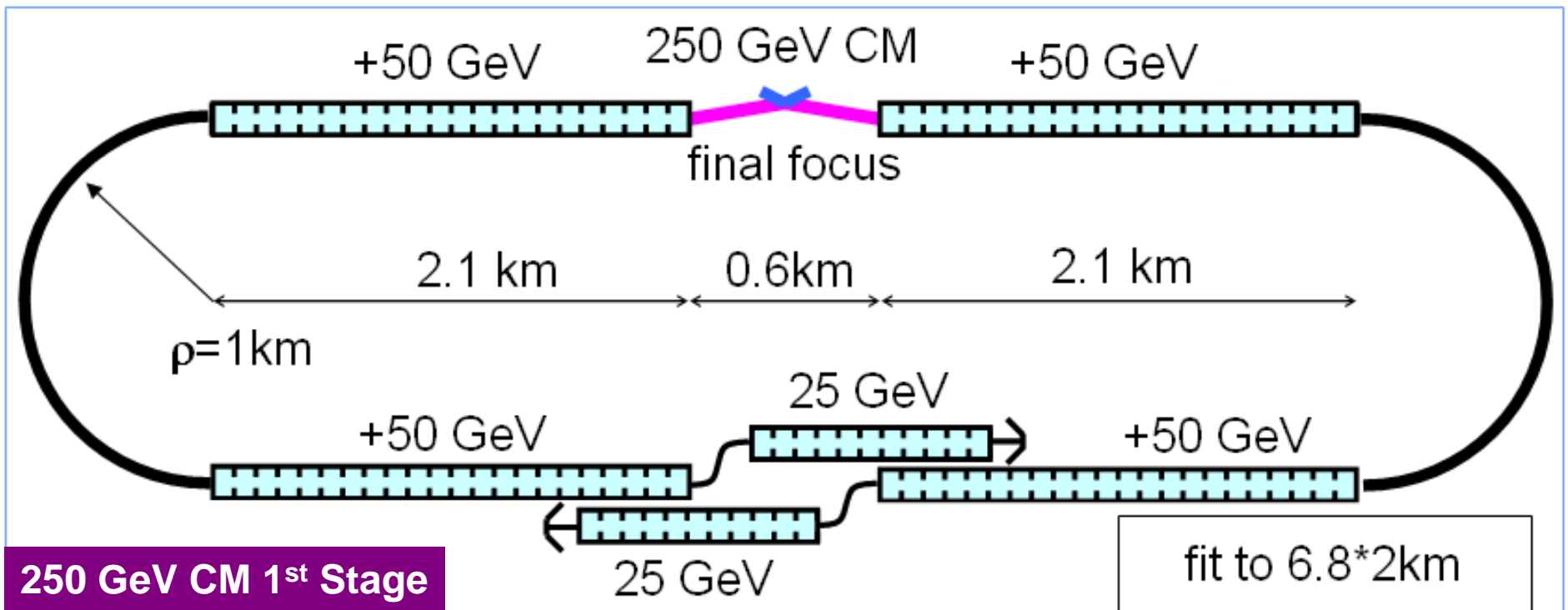


Staging ILC

materials for brainstorming

Motivation and strategy

- Strong physics motivation for ILC
 - Difficulty to sell the full scale ILC
 - Energy upgrade is brute force lengthening, thus expensive
- → **staged ILC ?**
- Requirement to the first stage:
 - more **affordable**
 - can be potentially upgraded to **full RDR performance**
 - allow upgrades, especially for $>1\text{TeV}$, based on **advanced ideas**
- Focus on Fermilab site as an example
 - prefer not to expand beyond the site boundaries
 - explore synergies with Fermilab projects (neutrino source, project-X, muon collider)
- Assume that LHC physics will motivate a lower E 1st stage



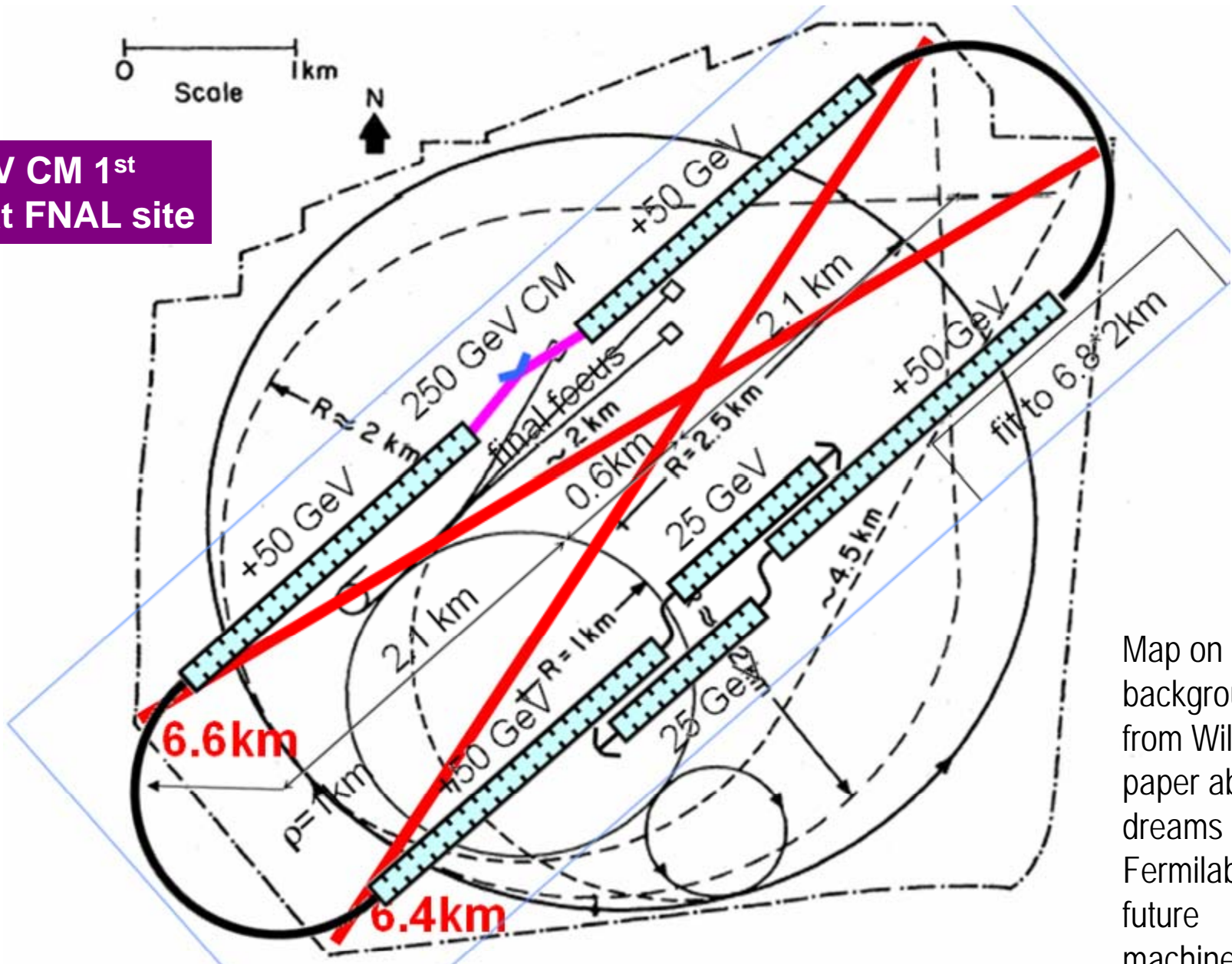
250 GeV CM 1st Stage

The radius of turn is scaled from SLC arc, assuming $\delta\gamma\epsilon < 0.5e-6$
 Assumed geographic gradient 23.1 MeV/m (31.5 MeV/m * 75%)

- DR may be in the racetrack tunnel or in the Tevatron tunnel
- Positron source may be conventional-advanced or Compton
- Arcs scaled from SLAC arcs to limit emittance growth to $\delta\gamma\epsilon < 5E-7$ m
- Mostly fits to FNAL site
- Upgrades: expansive (beyond site boundary) or by advanced ideas like plasma acceleration on the same site
- Linacs & tunnels -- potential synergy with other FNAL projects

**All statements
tentative &
require detailed
studies**

250 GeV CM 1st
Stage at FNAL site



Map on the background is from Wilson's paper about dreams on Fermilab future machines

FIG. 11. The Fermilab site with a ring 2.5 km in radius inscribed and with possible external beam lines indicated.

1st stage

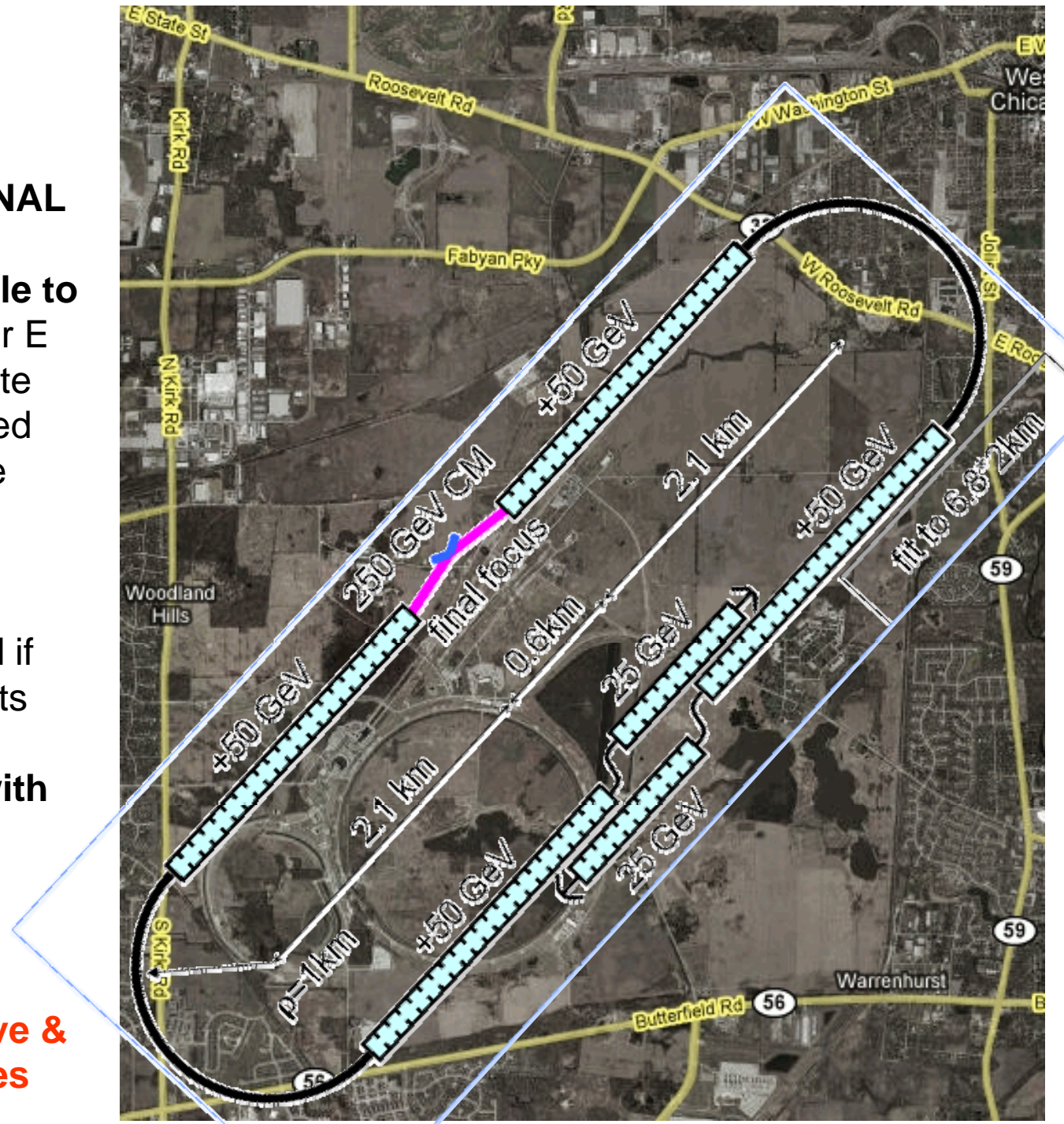
250 GeV CM e+e- at FNAL

Potentially upgradeable to ~0.5TeV CM and higher E by expansion beyond site boundary or by advanced techniques on the same footprint

Options like e-e- or gg may also be considered if motivated by LHC results

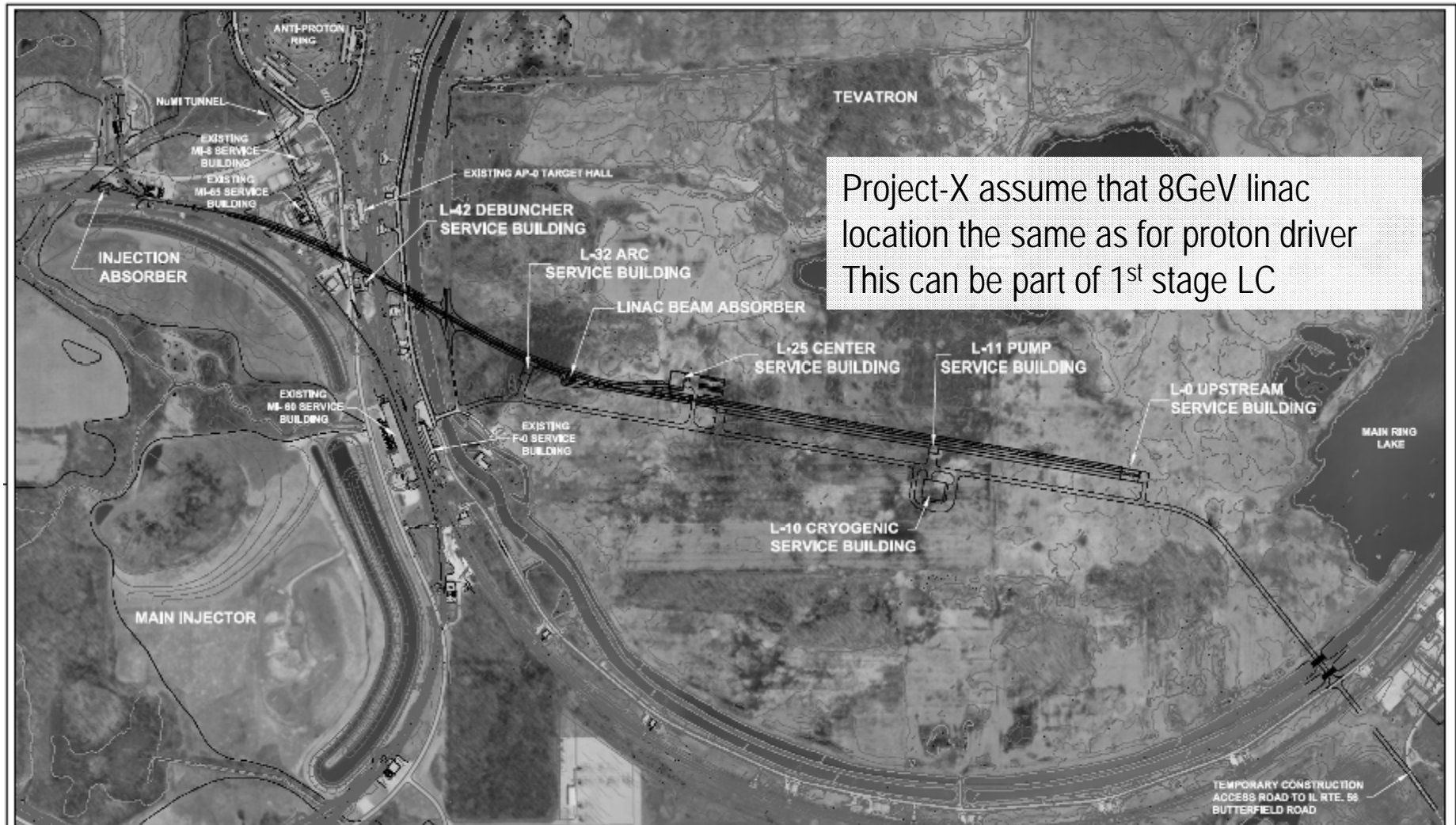
Potentially synergic with project-X & other FNAL project

All statements tentative & require detailed studies



1st stage ILC and project-X and

- Synergy to be further investigated:
 - the 1st stage ILC can include functions of project-X



Staging categories

- A: Different time scales for construction and commissioning with variables being e.g. number of tunneling machines, number of tunnels, shallow versus deep, cut and cover, type of e+ source, commissioning scenarios with e- only, site specific layouts, IR hall and detector construction scenarios. All of these without any changes in the initial goals of energy and luminosity.
- B: Energy and or luminosity versus Time. May include scenarios where the energy reach increases with time starting at less than 500 GeV and increasing to 500 or beyond. These are scenarios where with the standard resource limited schedules, we attempt to get physics started as early as possible.
- C: All the unconventional ideas including different machine designs which somehow can morph into a machine that can have all the physics capabilities of the RDR design. This could include a gamma-gamma to low energy Higgs factory with an IR and other systems stripped to the bone if that could justify the entrance fee.
- D: Staging of technical systems that may not necessarily greatly affect the luminosity or energy, but could affect, for example, availability, or possibility of some diagnostics measurements, etc.

Brainstorming...