JLEIC cost: 200GeV vs 100GeV

Background

- **At the mid-February meeting of the JLab Accelerator Advisory Committee, there was discussion of pushing to 200 GeV to cover the full $\sqrt{s}$ range in the White Paper. Consequently we received a recommendation to look at increasing the ion ring to handle 200 GeV protons.**

- **Bob McKeown asked for preliminary cost estimates to be ready for Science Council meeting in September**
  - **Build for 200 GeV**
  - **Build for 100 GeV and later upgrade to 200 GeV**

- **How to get there**
  - **Keep it simple:**
    - **Nominal change that had been presented was to double the fields in the ion ring.**
  - **Unstated but "obvious": little change in average luminosity over present operating range.**

Laundry list: Stuff that got changed

- **Doubled magnet fields in arcs and straights**
  - **New cost came from scaling TAMU number for 3T cosθ dipole**
    - **Used 3x on cold mass: split difference between TAMU's ~2x for superferric and the canonical 4x (proportional to stored energy)**
    - **½-cell: $239k for 3T superferric, $1030k for 6T cosθ**
  - **Increased magnet power (4x to keep ramping time fixed)**
- **Doubled lengths of RF fields**
  - **2x acceleration (keep ramping time fixed)**
  - **2x cryomodules: bunch control and crabbing**

Laundry list: Stuff that got changed (cont'd)

- Doubled energy of HE cooler
- Adjusted cryo plant for extra load from cryomodules
- LCW increase for additional magnet and RF power
- Service building space for RF
- All the associated labor (mostly for installing extra stuff)
- Updated "judgement" contingency
- PED, OH, and escalation treated as before

Laundry list: Stuff that was not changed

- **Stuff around IP: would be too much of a WAG**
- **Site power**
- **Magnet power supply building size**
- **LCW distribution in tunnel**
- **Tunnel length**
  - **Would likely have to change in order to accommodate the additional RF cavities and potential changes in IP unless lattice is tightened up**
  - **Effort to redesign the lattice is nontrivial ⇒ don't do it right now**

And the answer is……..

100 GeV: $ 1.48 B

200 GeV: $ 1.98 B*

***Nb: Real increase is higher. Some items were not addressed and the magnet costs could well be higher than what was used.**

Next: Do the evolutionary scenario

1. **Decisions**
   - **How much “200 GeV” gets included in “100 GeV”**
   - **How much “100 GeV” gets thrown away**
2. **Crank the numbers**
   - **The cost for “100 GeV” will be somewhat higher than the baseline**
   - **The net cost for “200 GeV” will be higher, too**
     - **~$70M for “100 GeV” arc ½-cells alone, which would get added on top of the $1.98B.**

Questions?