80-Sector Storage Ring

- Idea:
  Remove the existing magnets and replace with an 80-sector ring, keeping existing beamlines in place.
- Benefits:
  lower emittance, more beamlines
- Problems:
  lower lifetime, harder to inject, smaller dynamic aperture, beamlines not spaced evenly
- Feasibility study would require a month or so
  - basic linear optics design
  - dynamic aperture studies
  - injection system design

High-Conductivity Chambers

- Idea
  Replace all the aluminum extrusions with copper or copper-coated chambers.
- Benefit
  Reduced resistive wall effect, leading to increased instability thresholds.
- Problems
  None
- Feasibility is an engineering matter.
- Physicists need to quantify potential benefit — time needed depends on status of our impedance model.

Titanium(?) ID Chambers

- Idea
  Replace all the ID chambers with copper-coated chambers made of a stiffer material, like titanium.
- Benefits
  Can make the horizontal opening larger for the same vertical gap, thus making it easy to get and maintain good injection efficiency.
- Problems
  None
- Feasibilty is engineering matter.

Microbunching Cavity

- Put a (passive?) cavity in the SR to induce a high-frequency microbunch structure on the beam.
- Benefits
  Maybe some users would like it.
- Problems
  Does the idea even work?
- Feasibility study would probably take a few weeks.

Beam Rotation Cavities

- Idea
  Put a pair of pulsed RF cavities in the ring to chirp/unchirp the beam and allow optical pulse compression.
- Benefits
  Could provide much shorter x-ray pulses.
- Problems
  May require two high-power rf systems.
  May introduce undesirable impedances.
- Basic feasibility study would require a few weeks, assuming we used S-band structures.

Longer Straights for Everyone

- Idea
  Replace all of the dipoles with 1.5m dipoles
- Benefit
  Longer straights for everyone.
- Problems
  Loose flexibility in optics, may be unable to get same low emittance.
- Feasibility study would require a few days. The matching is already done.

Permanent Magnet Multipoles

- Idea
  Replace all the quadrupoles and sextupoles with variable permanent magnets.
- Benefit
  More reliable, less maintenance.
  Reduced beam motion.
  PMs are smaller, leaving more room for beamlines.
- Problems
  From physics standpoint, none.
- Feasibility is an engineering matter.

Matched Kickers

- Idea
  Find a way to get precisely matched kicker waveforms.
- Benefit
  Less beam disturbance during top-up, particularly if sextupoles inside bump can be turned off.
- Problems
  Could require buying lots of parts and throwing out the “bad” ones to get a matching set.
  Remaining sextupoles will get stronger.
- Feasibility is an engineering matter.

More Skew Quads

- Idea
  Add two (?) skew quadrupoles at each ID to allow feedforward compensation of ID gap changes.
- Benefit
  Allows maintaining ultra-low vertical coupling as gaps are changed.
- Problems
  Finding space for the skew quads.
- Feasibility is an engineering matter.

Emittance-Preserving Wiggler

- Idea
  Use a high-field wiggler to adjust the horizontal emittance to compensate the emittance changes due to gap motion.
- Benefits
  Horizontal emittance will be constant, giving constant flux for users.
- Problems
  None
- Feasibility study would take a week or so.

Low-Emittance Booster

- Implement a low-emittance lattice for the booster by
  - splitting the cells, and/or
  - adding gradient to dipoles
- Benefits
  cleaner injection into the SR with less mismatched bump, giving cleaner top-up
- Problems
  Injection aperture will be smaller, leading to more trouble maintaining efficiency.
- Feasibility study will require a month or so.

Multi-bucket Booster Injection

- Idea
  - Put a “porch” on the booster ramp to allow injecting several pulses from PAR into arbitrary booster buckets.
  - Modify booster extraction and SR injection to allow transfering all of these buckets at once.
- Benefits
  We can fill many buckets at once, allowing top-up with shorter lifetimes and/or less charge injected per bucket.
- Feasibility is mostly a matter of power supply and kicker designs.