17TH ADVANCED BEAM DYNAMICS WORKSHOP ON
FUTURE LIGHT SOURCES

Sketch of a Future Storage Ring Light Source

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Based on 2 x APS/ESRF type machine and damping wigglers

- Circumference ~ 2 km
- More than 30 6-m long straight sections for IDs
- The rest will be occupied by wigglers, RF cavities,...

E = 4 GeV.

ε_x is lowered by

- doubling the circumference (θ^3 dependence)
- scaling with ε_x^2
- damping wigglers

Results in ε_x = 20 pm-rad

$I = 2A$ (RF at 350 MHz, 2000-2500 buckets $\Rightarrow$ 1 mA/bunch $\Rightarrow$ far below the intensity threshold). Bunch-by-bunch feedback can cure instabilities.

Brilliance of $2x10^{24}$ at 1 Angstrom. i.e. 4 orders of magnitude higher than operating facilities.

Lifetime limitations of 1 h overcome by top-up.

Intra-beam scattering limitations?

- Operate at full coupling
- Bunch lenghtening with a harmonic cavity (3-5 lengthening)
- Quick calculation for a 1 mA bunch with $\sigma_z = 20\mathrm{mm}$ gives ε_x = 80 pm-rad and a energy spread of 0.08%
- Emittance is increased a factor of 4. Not too fatal. Various parameters (energy, circurmference, undulators, bunch lengthening) could be optimized to find a compromise value for emittance.

The 10^{24} is acheived with well proven lattices and standard techniques.