MAX IV Storage Rings

Simon C. Leemann
MAX IV Facility

One size DOES NOT fit all!

- 3.4 GeV linac (SPF, FEL) ~ 300m
- 1.5 GeV SR (IR/UV) 12 DBAs
  \( \varepsilon_x = 6 \text{ nm rad} \)
- 3 GeV SR (X-ray) 20 MBAs
  \( \varepsilon_x < 0.3 \text{ nm rad} \)
MAX IV 3 GeV Multibend Achromat

- Many weakly bending cells
  - low emittance
- Keep compact (cost!)
  - strong and small multi-function magnets \(\rightarrow\) integration
  - Narrow vacuum chamber
    - Distributed pumping
    - NEG-coated chambers
- 100 MHz rf system with 300 MHz harmonic system
  - stretch bunches
    - manage instabilities
    - excellent lifetime
MAX IV Integrated Magnet Design
MAX IV 3 GeV Multibend Achromat

- Many weakly bending cells ➡ low emittance
- Keep compact (cost!)
  ➡ strong and small multi-function magnets ➡ integration
  ➡ Narrow vacuum chamber
    ➡ Distributed pumping
    ➡ NEG-coated chambers
- 100 MHz rf system with 300 MHz harmonic system
  ➡ stretch bunches
    ➡ manage instabilities
    ➡ excellent lifetime
MAX IV Vacuum System
MAX IV 3 GeV Multibend Achromat

- Many weakly bending cells
  ➡ low emittance
- Keep compact (cost!)
  ➡ strong and small multi-function magnets → integration
  ➡ Narrow vacuum chamber
    ➡ Distributed pumping
    ➡ NEG-coated chambers
- 100 MHz rf system with 300 MHz harmonic system
  ➡ stretch bunches
    ➡ manage instabilities
    ➡ excellent lifetime
Emittance determined by IBS and IDs

- Unique feature: lower emittance $\rightarrow$ better lifetime
- MAX IV 3 GeV SR is IBS-limited! (LCs and IDs can mitigate)
- Since lattice equilibrium emittance is so low, IDs determine emittance