



NORCC

FCC- specific accelerator R&D ideas

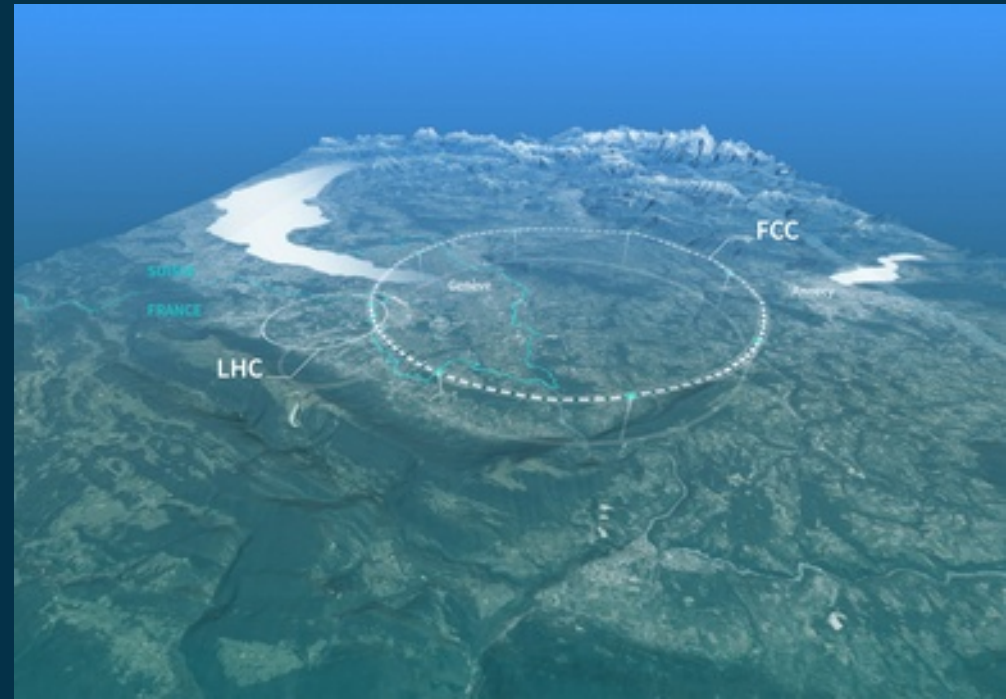


Kyrre Sjobak

NorCC workshop,
**Session 4 - Goals for FCC &
future colliders in general,
and how to meet them**
Trondheim, Sept. 5th 2024

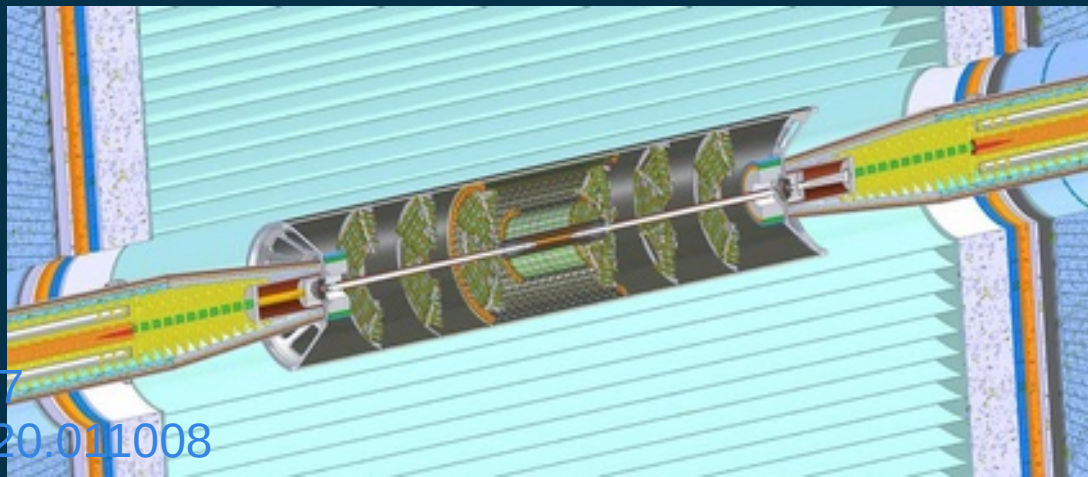
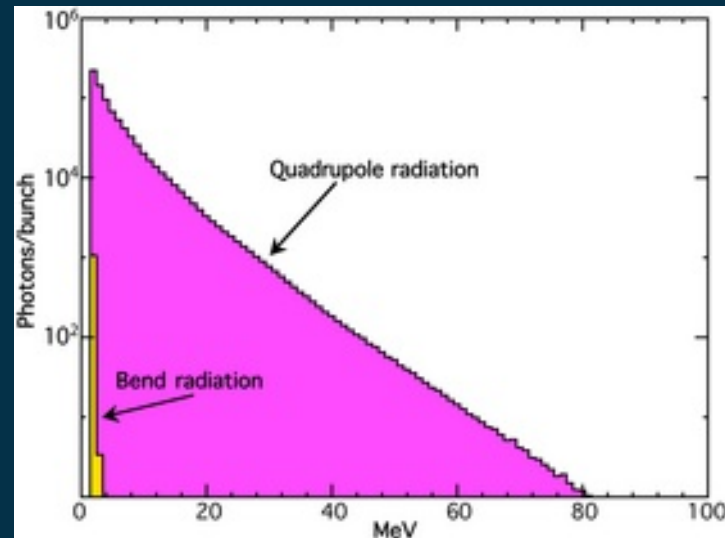
FCC accelerator development process

- FCC-ee and FCC-hh development currently driven mainly by CERN
 - Some contributions to technology such as magnets, cryogenics, MDI, as well physics of impedance etc. from outside
<https://fcc-global-collaboration-working-group.web.cern.ch/FCC-Collaboration-Status>
 - Some big national labs, e.g. CEA, contribute to beam optics and other “core” parts
- If FCC goes forward towards construction, it is important for the Norwegian accelerator community to be involved
 - Our main interest is FCC-ee; FCC-hh operation currently planned to start in the 2070s
 - Goal: Identify topics where we could contribute



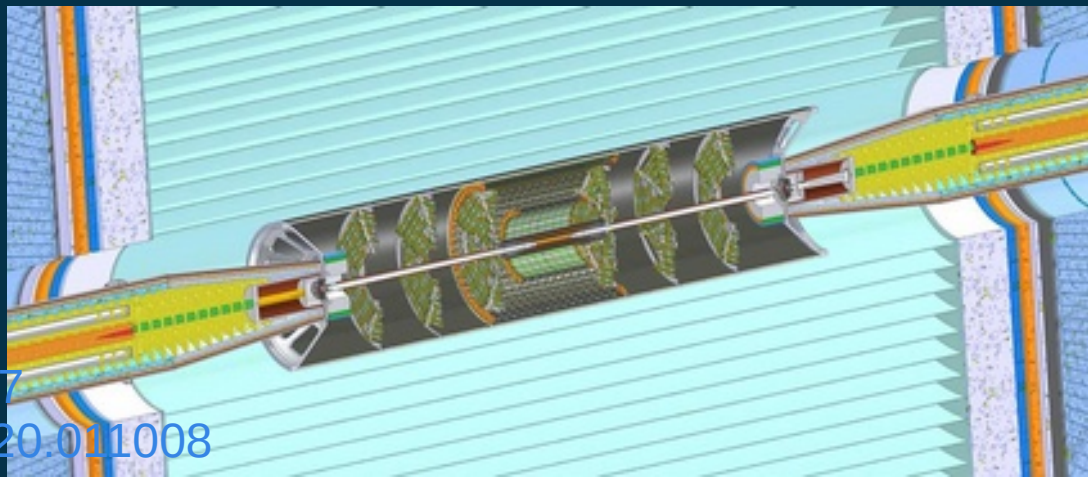
MDI: Machine Detector Interface

- Machine-induced backgrounds in the detectors
 - Synchrotron radiation power and energy must be minimized ($E_c < 100$ keV)
 - Beam-gas backgrounds
 - Beam halo from collimation etc.
- Mechanical integration and optimization
 - Thermal loads
 - Shielding masks and
- Beam accident scenarios
 - E.g. fast crab cavity failure
- Beam optics optimization for MDI



MDI: Machine Detector Interface

- This topic has the benefit of drawing on synergies co-located in Oslo:
Accelerator + detector electronics + analysis
- On the accelerator side, we have experience with hadron synchrotron tracking (e.g. SixTrack) and radiation transport Monte Carlo (Geant4)
 - We also have experience with simulation of accident scenarios for HL-LHC, in view of protecting the detectors
- Need to find a good sub-topic; e.g. INFN, DESY, and EPFL are already involved



Summary

- If the FCC looks like it is going forward, the NorCC accelerator group should look for opportunities to participate in order to stay relevant
 - In parallel to LC vision and e.g. medical applications
- An area that looks especially promising and well-suited to NorCC expertise is Machine Detector Interface
 - Synergies with detector electronics and physics analysis
- Possibility for participation or leading role in low-angle subdetectors/experiments far from IPs?
- Early involvement could be to host CERN-based PhD / technical students working on FCC at NorCC institutions ⁵