Projects in MDI, EPOL, and Detector Concepts

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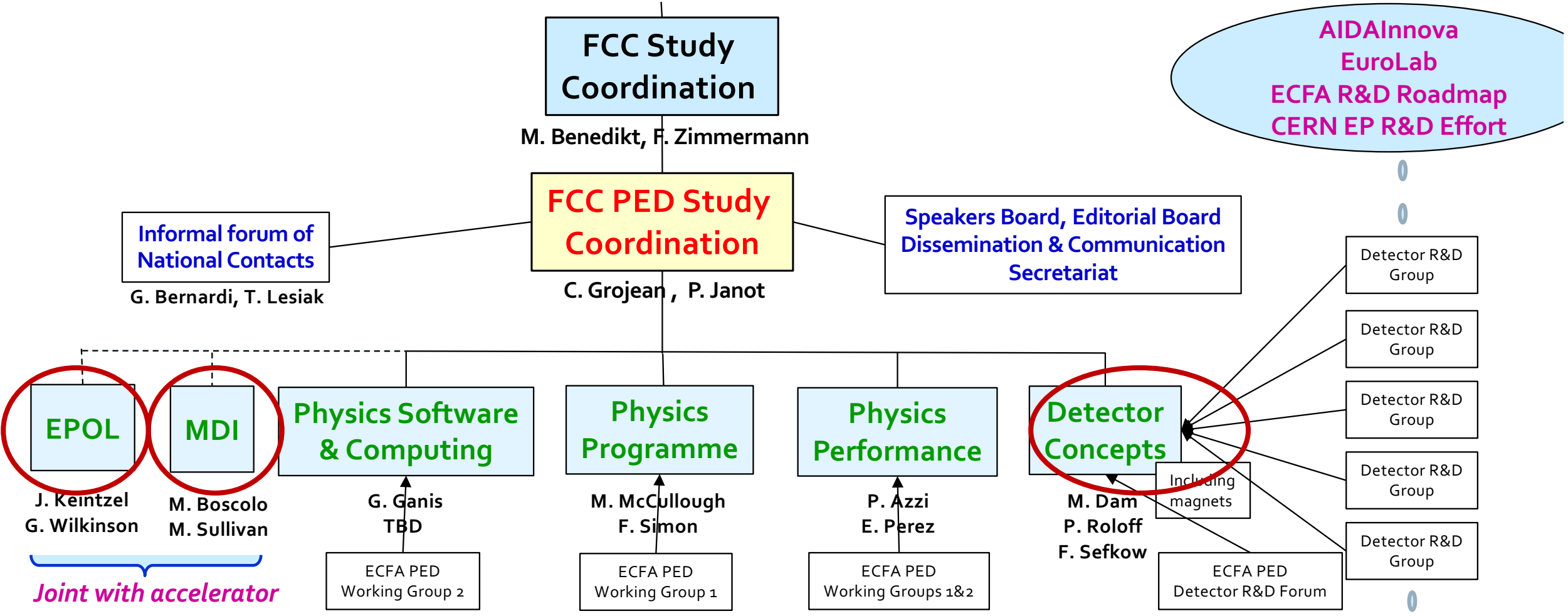

Entry points for EPOL-related tasks (non-exhaustive list)

Experimental inputs to calibration of energy-related quantities

Di-fermion events can be used to calculate boost, energy spread, crossing angle and energy.

Almost all studies to date performed with muons, and under idealised conditions.
Should be repeated in more realistic detector and physics framework, investigating in particular the impact of QED corrections and misalignments. True systematics of radiative return events for determination of beam energy should be investigated. Need to be extended beyond dimuons.

Input on polarimeter design

FCC-ee polarimeters will be highly precise calorimeters, with a demanding high-power laser system.
Great opportunity for institute involvement !

Accelerator physicist and particle physicist input to core calibration issues

- Depolarisation and free-spin precision strategies
- Development of time-dependent energy model – impact on key observables
- Strategy for interaction-point specific corrections (in particular opposite sign dispersion studies)
- Monochromatization-related issues…
- ……

Machine Detector Interface

Topics covered in the WG, also in joined collaboration with other groups

- **Engineering design of the MDI**
- **Backgrounds study** (synchrotron radiation, beam losses, collision products, collimators, masking, injection background)
  → gives requirements to the optics: energy acceptance, injection scheme, dipoles upstream the IP
- **Luminosity measurement**
- **IR magnets**
- **IR beam diagnostics and IP detectors**
- **Alignment tolerances & vibration control**
- **IR heat load assessment**
- **Beamstrahlung photon dump**
- **IR mock-up**

broad variety of activity & expertise, accelerator and experimental physics, engineering, technology

Regular FCC-ee MDI meetings, second Monday of each month at 16H00-18H00: https://indico.cern.ch/category/5665/

MDI mailing list : self-subscription to the e-group **fcc-ee-mdi**
from this page: https://e-groups.cern.ch/e-groups/EgroupsSearchForm.do

Projects in MDI

There is still long way to go to develop a design of the MDI with all the main devices, get good confidence of the understanding of the backgrounds sources, have an executive drawing of the IR magnets.

For example, we need

- Engineering of the lumical (for the moment we are studying its integration, assembly, and its support as a whole)
- Engineering study for the integration of the vertex and outer tracker for CLD
- Refinement at Geant4 and key4hep level of the detector and environment model for detector backgrounds evaluation, as well as for the lumical

But this is only to give three examples.

Please get in touch with us with you are interested, subscribe to our mailing list !

How To Get Involved Detector Concepts

Slide shown Tuesday by Felix Sefkow

Process towards Detector R&D Collaborations

- register at https://indico.cern.ch/event/957057/page/27294-implementation-of-the-ecfa-detector-rd-roadmap

Progress or new ideas in FCC-targeted R&D, detector concept optimisation

- Monthly Detector Concept meetings **https://indico.cern.ch/category/15054/** - next on Mon Feb 13
- please contact us (Mogens Dam, Philipp Roloff, FS), and sign up to FCC-PED-DetectorConcepts@cern.ch

Optimisation studies with full simulation

- see overview by Philipp Roloff: https://indico.cern.ch/event/1137809/contributions/4813817/attachments/2420501/4143312/fcc_detector_concepts_meeting_04_04_2022.pdf
- many open topics, existing framework

Contributions towards full simulations

- validation of CLD, further development of IDEA and GranuLAr
- contact software convenors and detector concept groups

Feasibility of the MDI

- engineering and simulation; contact MDI convenors