

hh analyses

hh → WWbb → lvqqbb

B. Di Micco (+ V. D'Amico ex PhD, post-doc
Roma Tre now Munich)

Analysis still blinded, paper editors assigned: B.
Di Micco editor

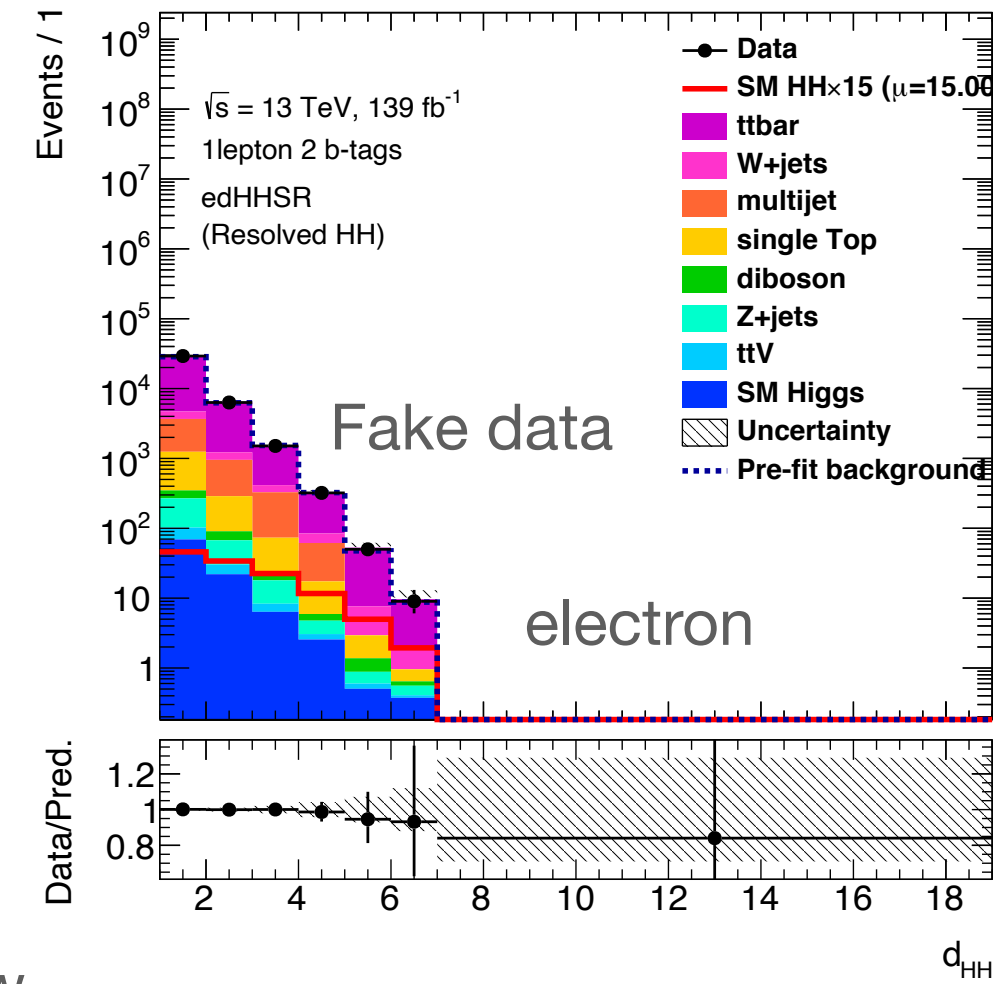
hh → γγbb

B. Di Micco, R. Di Nardo, A. D'Onofrio
(outgoing, PNRR position in Naples), F.
Monteali (Phd.), R. Orlandini (undegraduate)

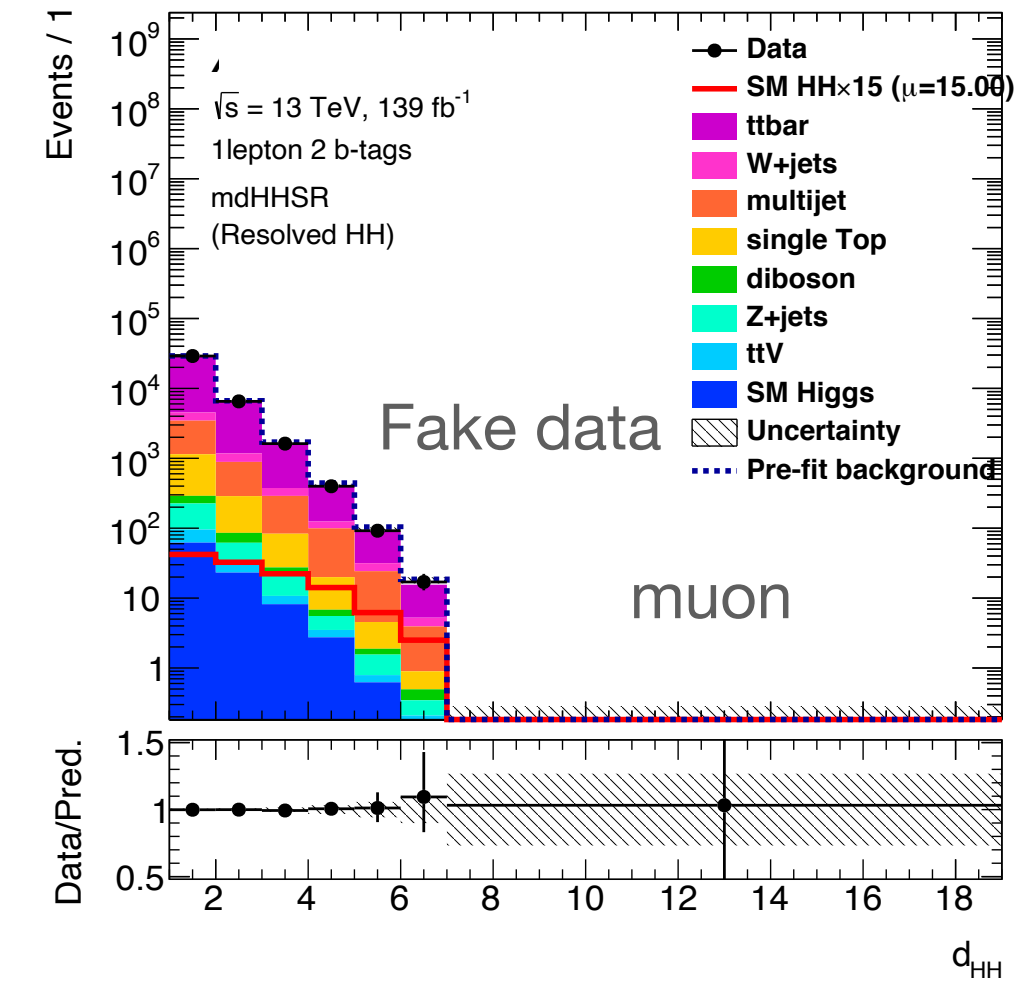
A. D'Onofrio Run II analysis contact

- Work on finalising Run-II reanalysis including ggF and VBF production modes
- implementation of kinematic fit with transverse momentum conservation for Run-III analysis
- plan for 2024: work more deeply on the new analysis including effort from A. Farilla and M. Biglietti

Neural network discriminant in 2 signal regions




(a)




(b)

Run-II re-analysis under review



ATLAS Note
ANA-HDBS-2021-10-INT1
24th May 2023



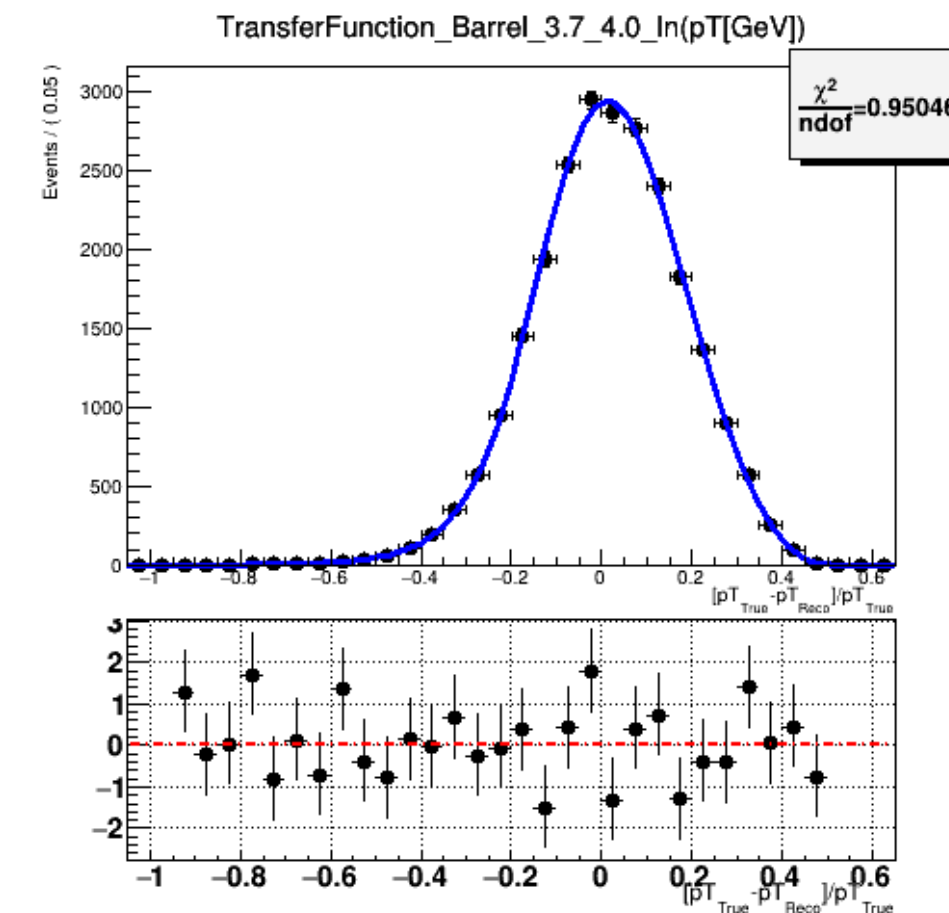
Draft version 0.9

Legacy search for Higgs boson pair production in the $b\bar{b}\gamma\gamma$ final state with the full Run 2 13 TeV pp collision data collected by the ATLAS Experiment Supporting note.

Louis D'Eramo^a, Adelina D'Onofrio^b, Jared Adelman^c, Elizabeth Brost^m,
Brendon Bullard^k, Valentin M. M. Ciarro^c, Luca Cadamuro^g, Leonardo
Carminati^d, Chi Lung Cheng^e, Giulia Di Gregorio^f, Biagio Di Micco^b, Tristan
Du Pree^q, Marc Escalier^g, Luca Fiorini^h, Luca Franco^r, Tao Hsu^s, Taining
Huangⁱ, Tom Ingebrechtsen^j, Zihang Jia^k, Shan Jin^k, Arthur Lafarge^a, August Lee^s,
Changqiao Li^p, Kun Liu^p, Stefano Manzoni^c, Giovanni Marchioriⁱ, Elena
Mazzeo^d, Ashley Ellen McDougall^q, Federico Monteali^b, Davide Pietro
Mungo^o, Jannicke Pearkes^l, Laura Pereira Sanchez^h, Kevin R. Pitt^o, Arantxa Ruiz
Martinez^h, Despoina Sampsonidou^o, Ivan Sayago Galvan^h, Qiuping Shen^p,
Philip Sommer^c, Alexandra Sidley^q, Abraham Tishelman-Charny^h, Ruggero
Turra^d, Mirella Vassilev^k, Caterina Vernieri^k, Alex Zeng Wang^c, Christian
Weber^a, Sau Lan Wu^e, Ligang Xia^k, Haijun Yang^p, Brandon Zhang^l, Rui Zhang^e,
Yixiang Zhang^k

kinematic fit studies for Run-III

Transfer function parametrisation, R.
Orlandini master thesis



di-jet invariant mass after
kinematic fit (F. Monteali)

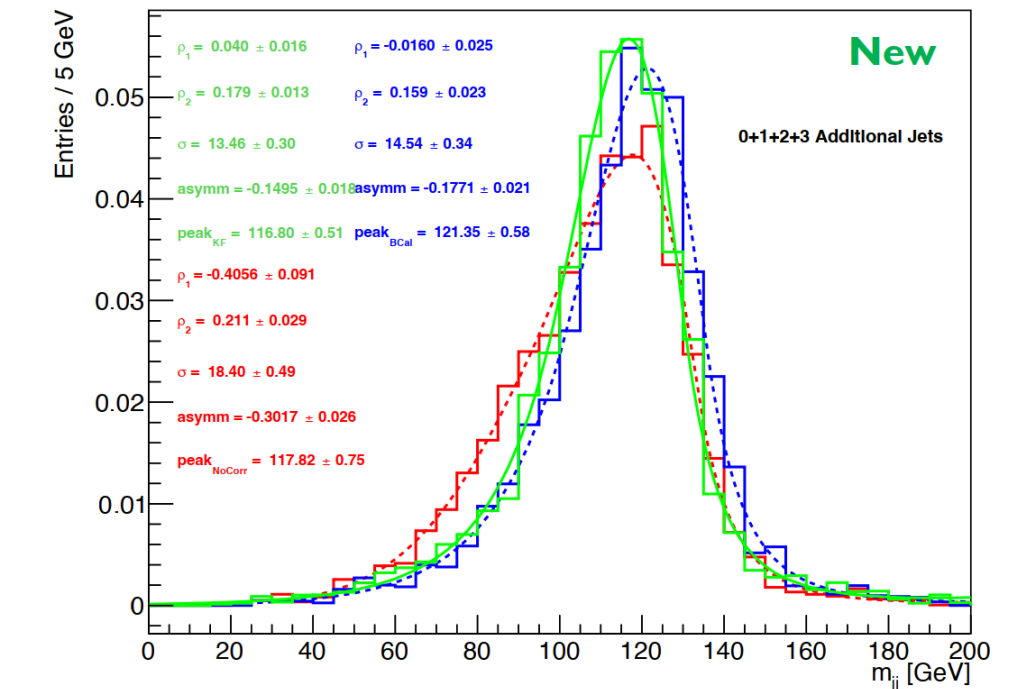


Figure 5.14: Di-jet invariant mass plot where the KF utilizes the additional transfer function on E and p_T . The colour represent data reconstructed with no corrections (red), BCal correction (blue) and the Kinematic Fit (green). The continuous lines represent the fitted Bukin distributions while the numbers represent the fitted functions parameters according to the relative colour.



AIDANNOVA/RD-FCC

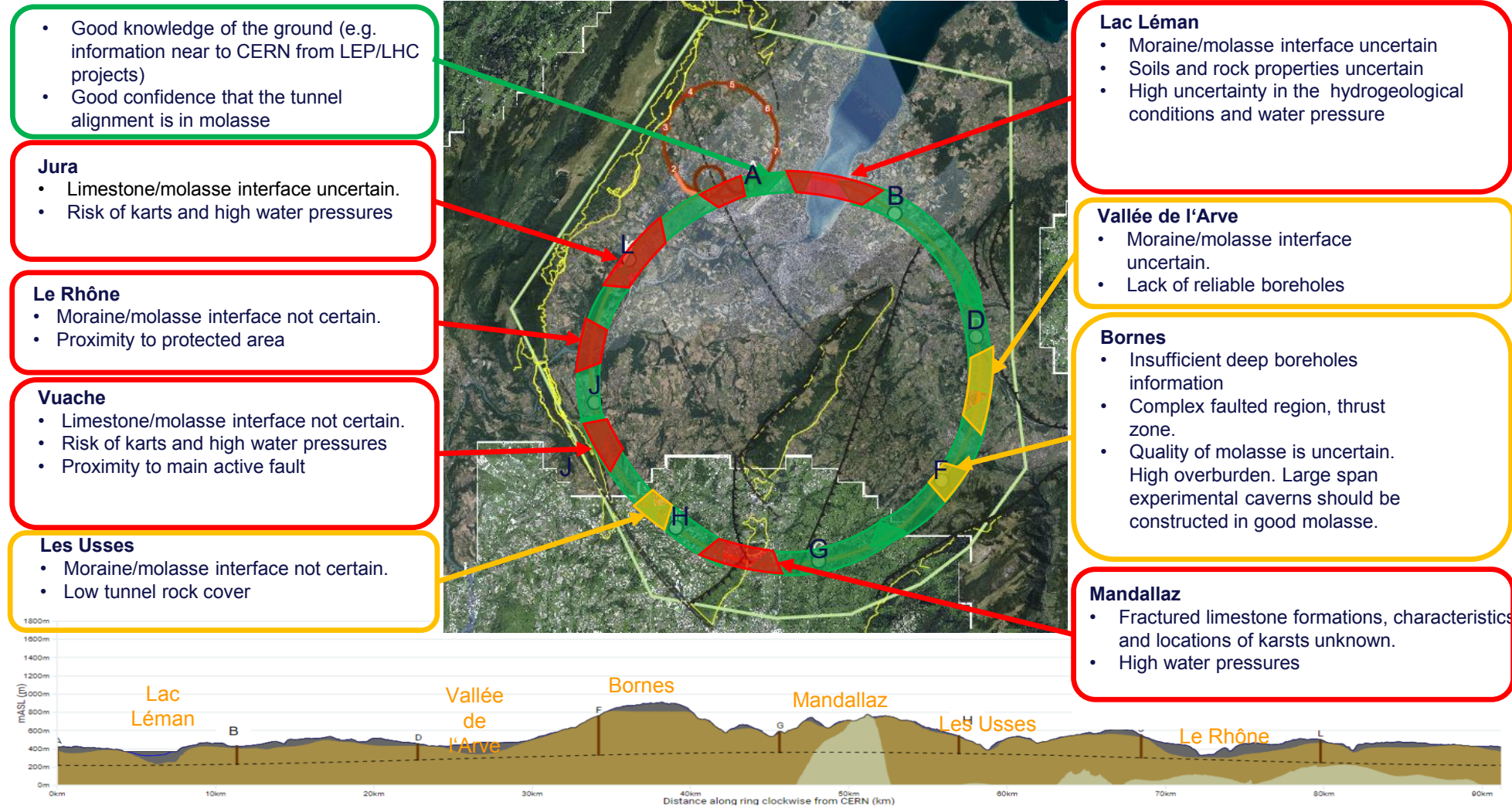
Looking for future

B. Di Micco - Preventivi 2023 - Congresso di Sezione di Roma Tre

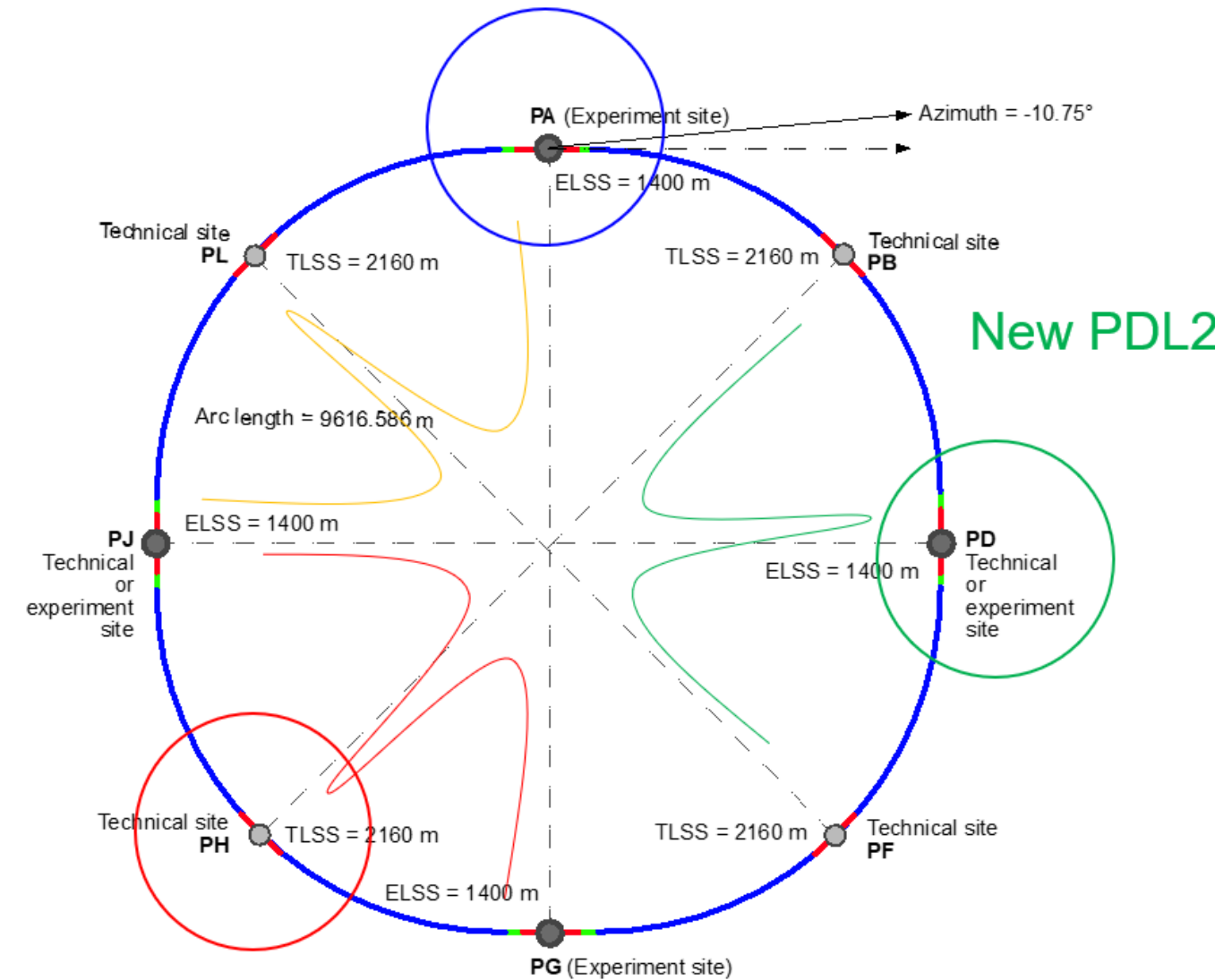
RD-FCC status

Main focus on FCC-ee: cost effective, broad and unreproducible physics reach: Z EWK physics, W mass, Higgs Physics, top mass, Higgs boson energy potential

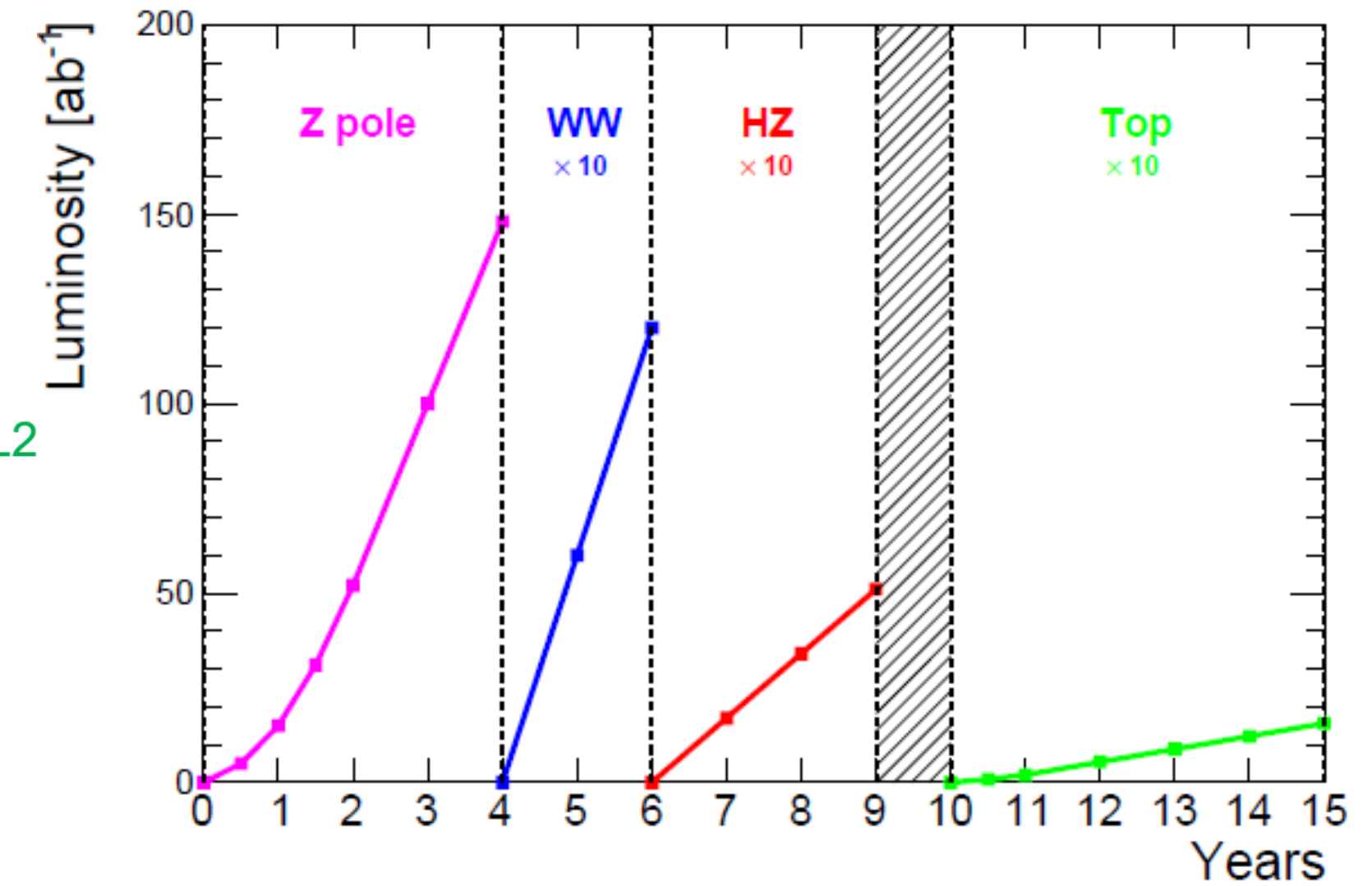
Areas of Geological Uncertainty



PDL1, existing sub-station Bois de Serves



New PDL3

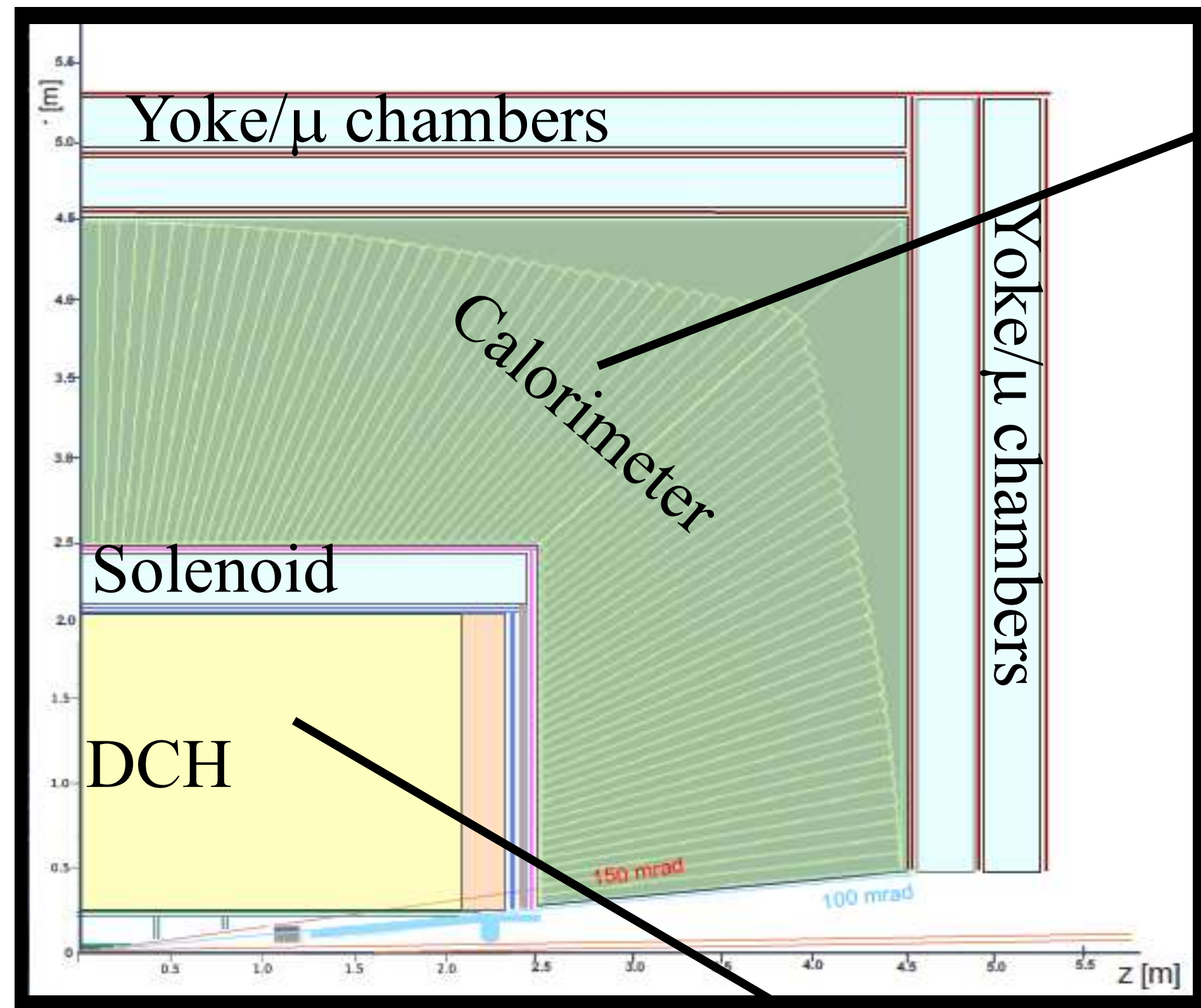


Physics goal is clear, current work on the machine design and detector

- What's needed:
- 1) political acceptance from Switzerland to have tunnel under Geneva Lake;
 - 2) financial support for the tunnel from interested countries: French, Switzerland;
 - 3) available budget for CERN to build up the accelerator;
 - 4) strong support from Physics community to concentrate collider physics effort at CERN and on a circular ee collider

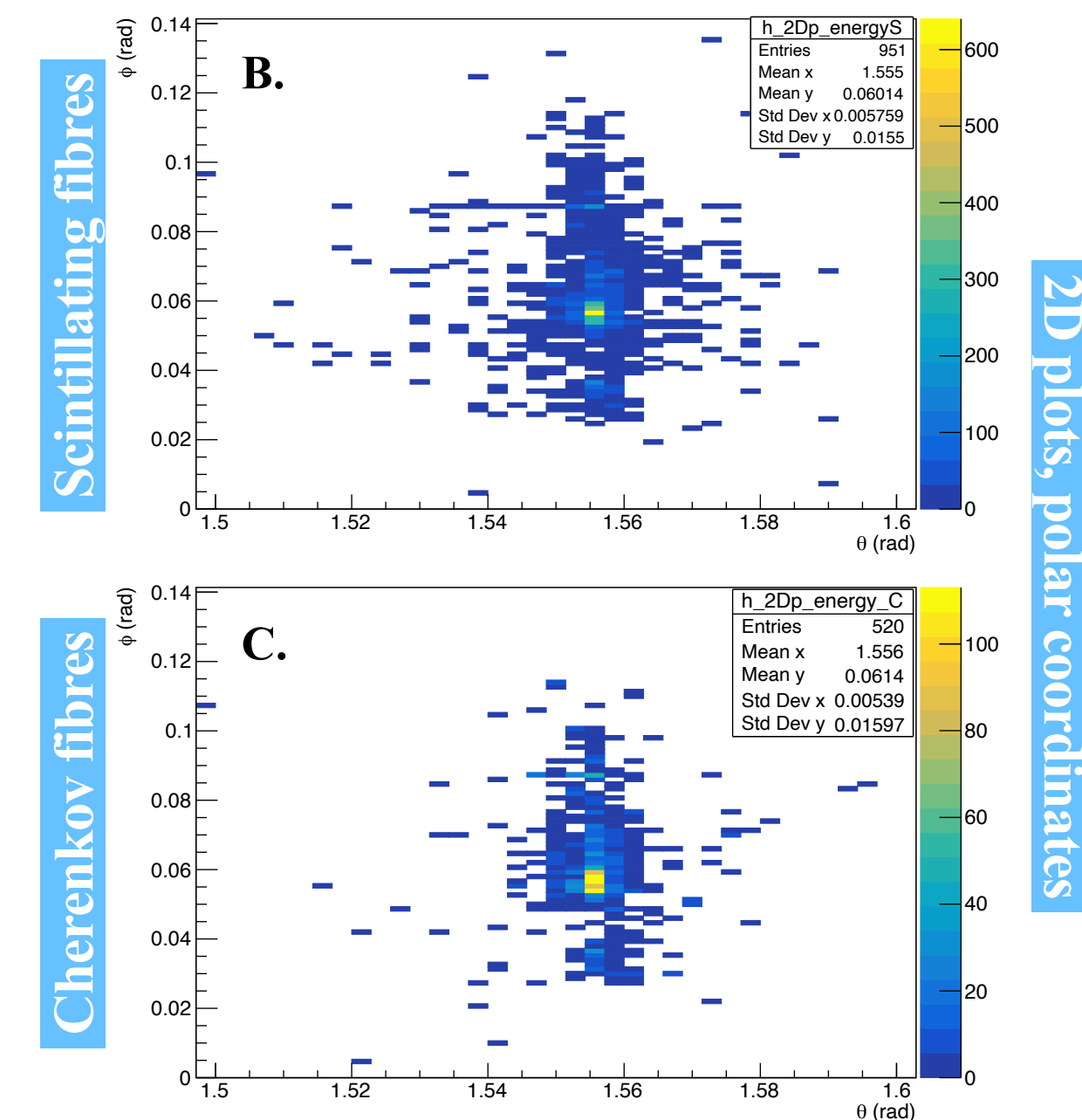
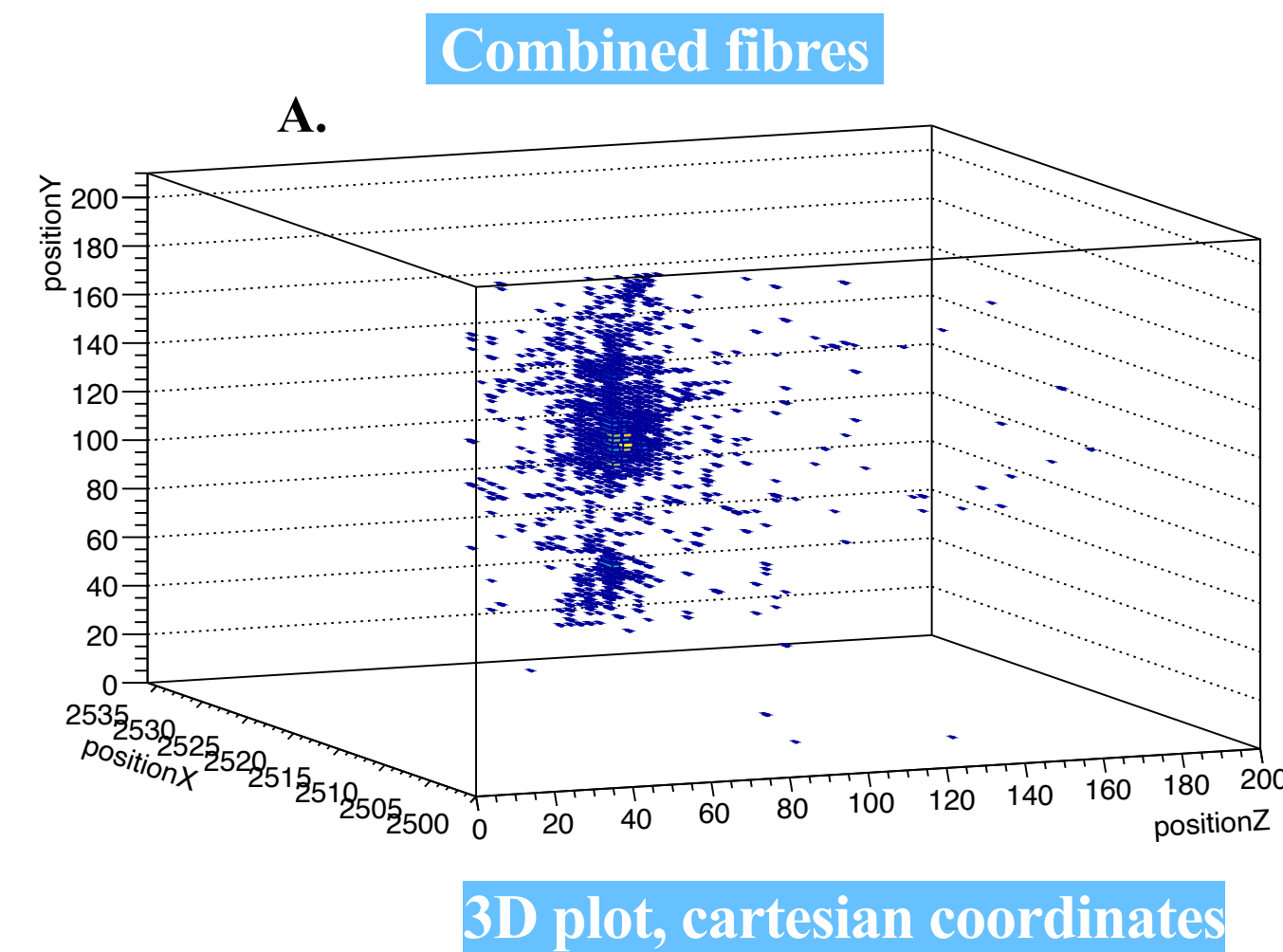
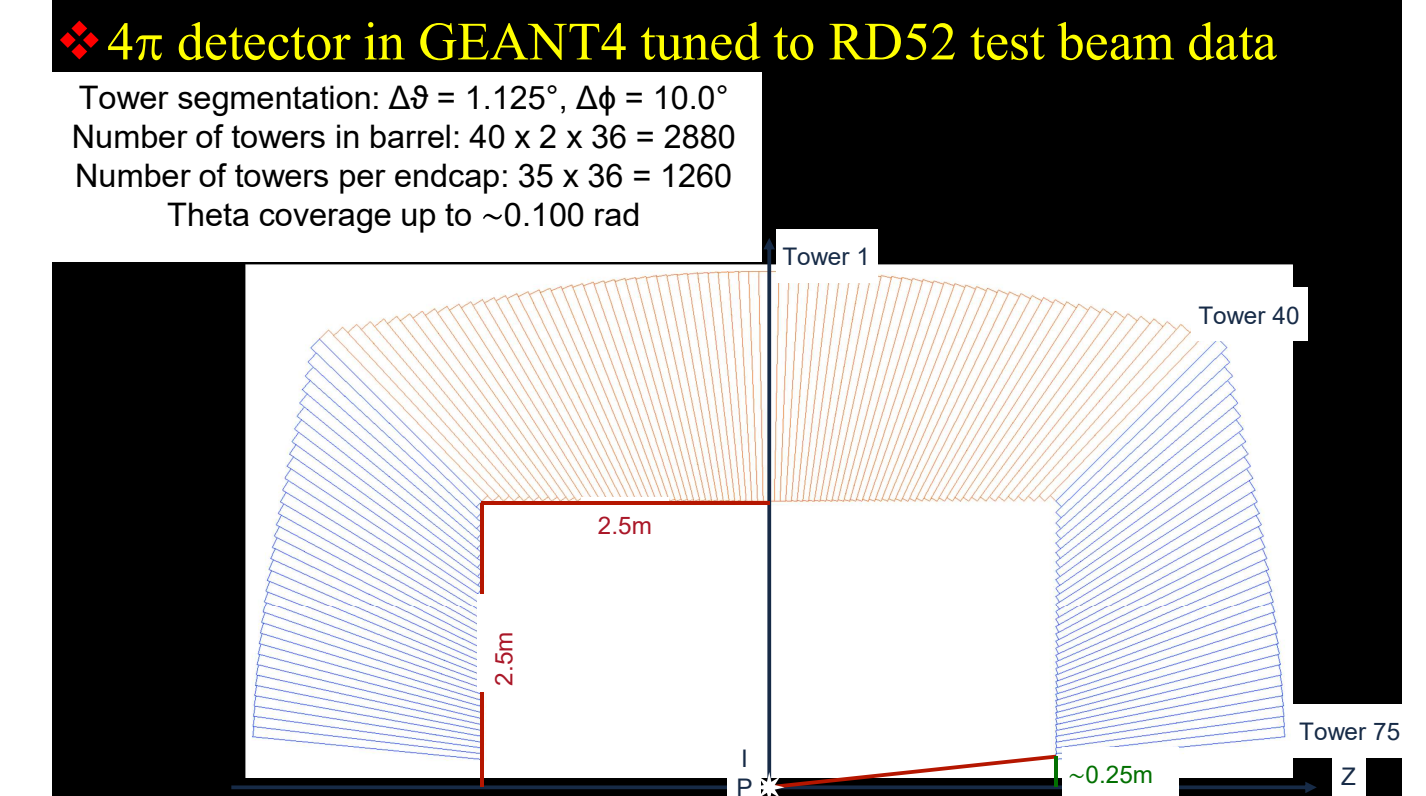
The IDEA detector concepts

Last machine design with 4 Interaction Points (maximise integrated luminosity and broaden the physics reach through different and complementary technology)

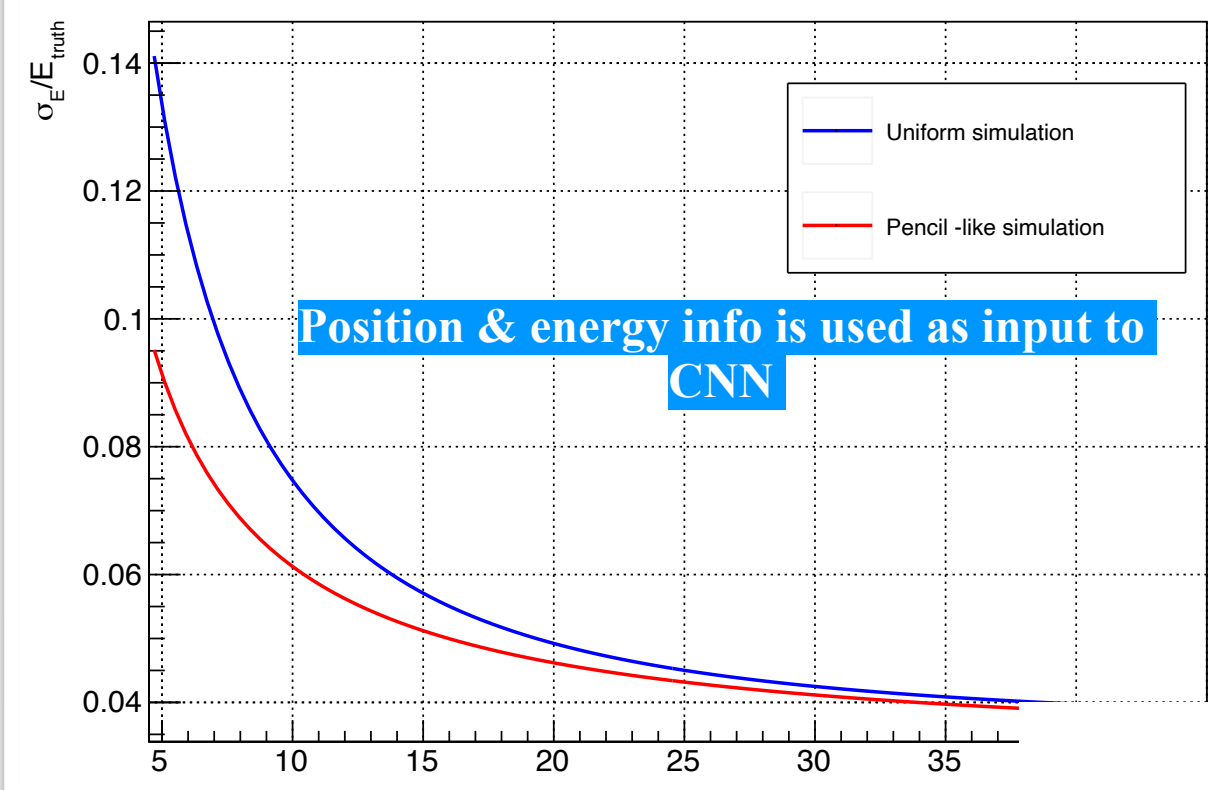
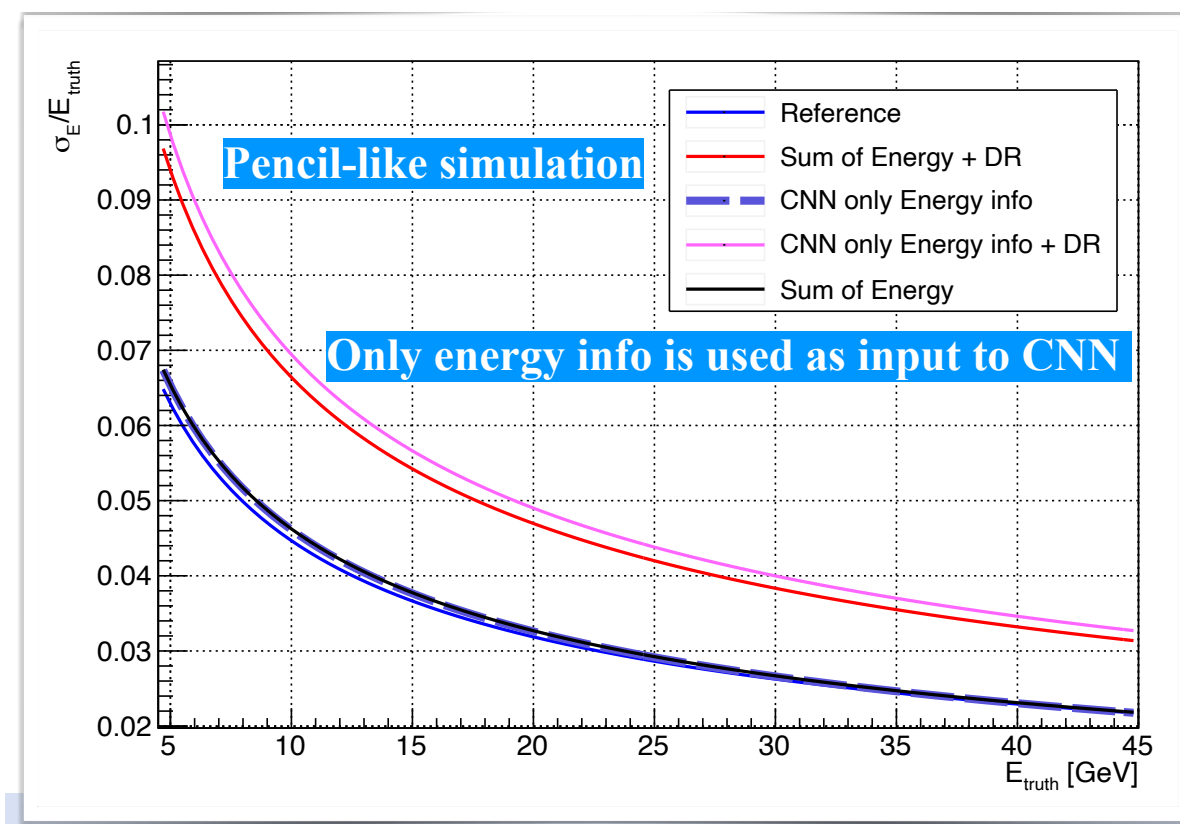
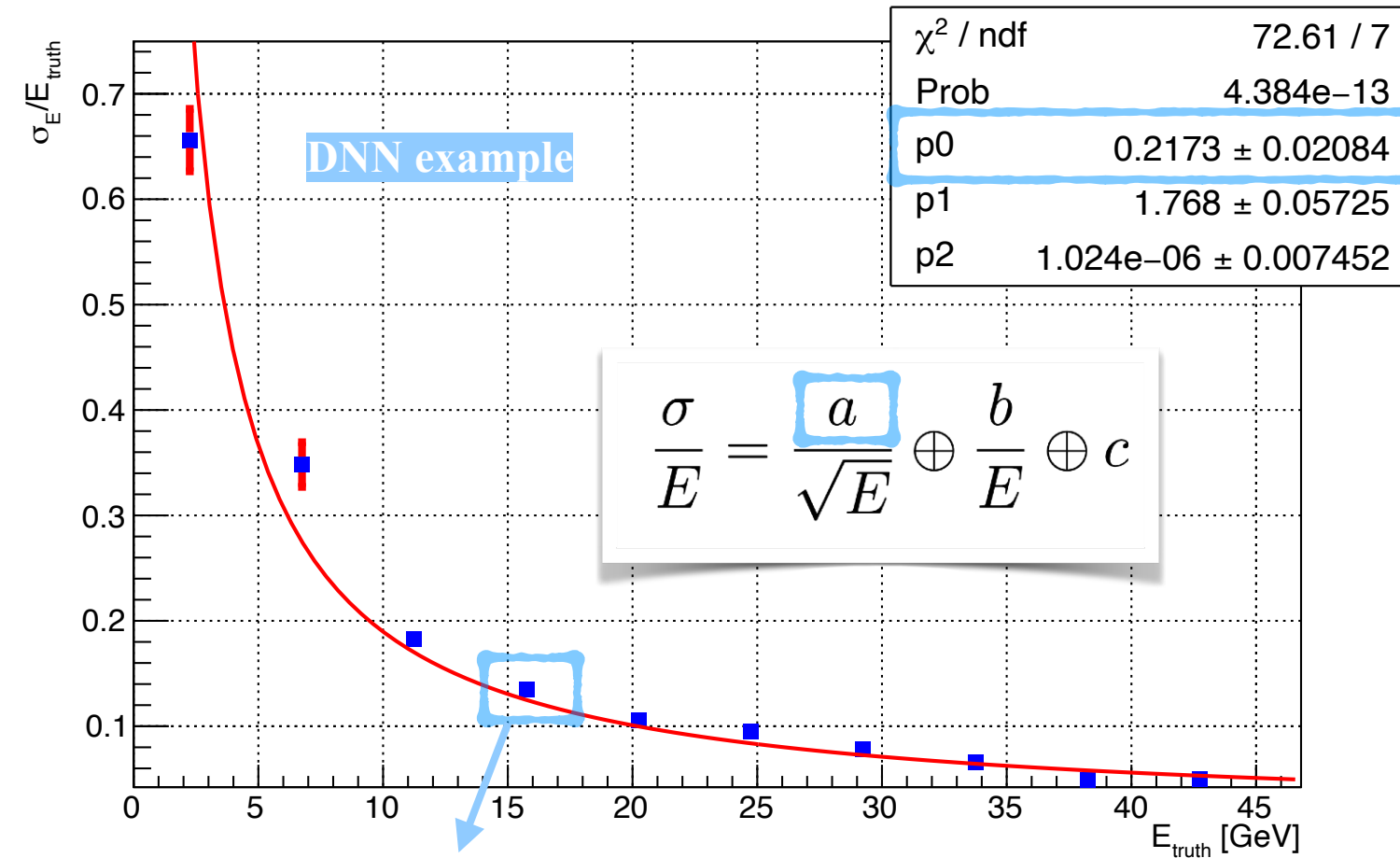
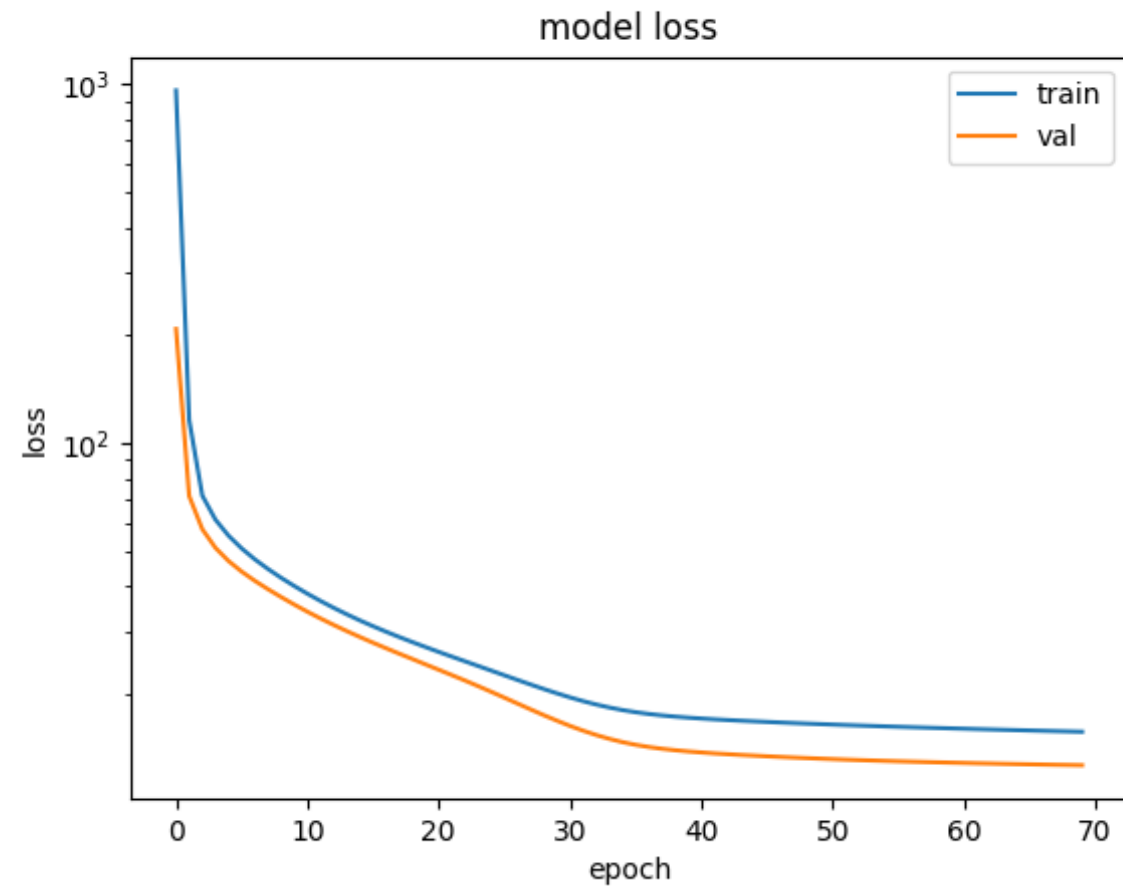


spaghetti dual read-out calorimeter

cylindrical drift chamber



Neural network electron reconstruction (AIDANNOVA PROJECT)



RD-FCC AIDANNOVA

The group:

M. Biglietti, B. Di Micco, R. Di Nardo, A. D'Onofrio, A. Farilla

Core work carried on by A. D'Onofrio, simulation by M. Biglietti

A. D'Onofrio leaving for better PNRR position in Naples

Hopefully one new position will be open soon

Hardware requirement:

Absolutely needed: Modern GPU with NVIDIA software (at least one for smooth software transition), the one that we were using broke.

20 GPUs should arrive from CINECA but hardware configuration and timeline are uncertain

Scientific outcomes: Talks/workshops

- 🌐 [ECFA, DESY Workshop 2022](#)
- 🌐 [CepC Workshop 2022, Nanjing- IHEP](#)
- 🌐 [Lyon FCC Italy-France meeting](#)
- 🌐 [IFAE 2023, Catania](#)
- 🌐 [CHEP 2023, Norfolk USA](#)