

APC team news

Giovanni Marchiori

FCC France - contacts meeting
30 April 2021



Local team

- Current team composition
 - Staff: Gregorio Bernardi, GM
 - Students: Ang Li (PhD, 1st year), Mariette Jolly (M2 internship, 29/03-26/06)
 - More people in team, but working on ATLAS 100%
- Short-term evolution
 - 1 M1 (SU) and 1 L3 (ENS) internships starting around June (~2 months), w/ GB and GM respectively
- Activities on case studies:
 - ZH inclusive xsection measurement (Ang+Greg, further aid by M1 internship)
 - H->bb/cc/gg BRs (Mariette+GM, further aid by L3 internship)

ZH inclusive xsection measurement

- First results presented by Ang in 2nd FCC France workshop, focusing on dimuon channel: https://indico.in2p3.fr/event/23012/contributions/89963/attachments/62029/84792/2021_01_21_FCC_Ang_LI_Ver2.pdf

- A few issues identified:

- Bias in fitted signal yield
- Few % stat uncertainty in fitted signal yield

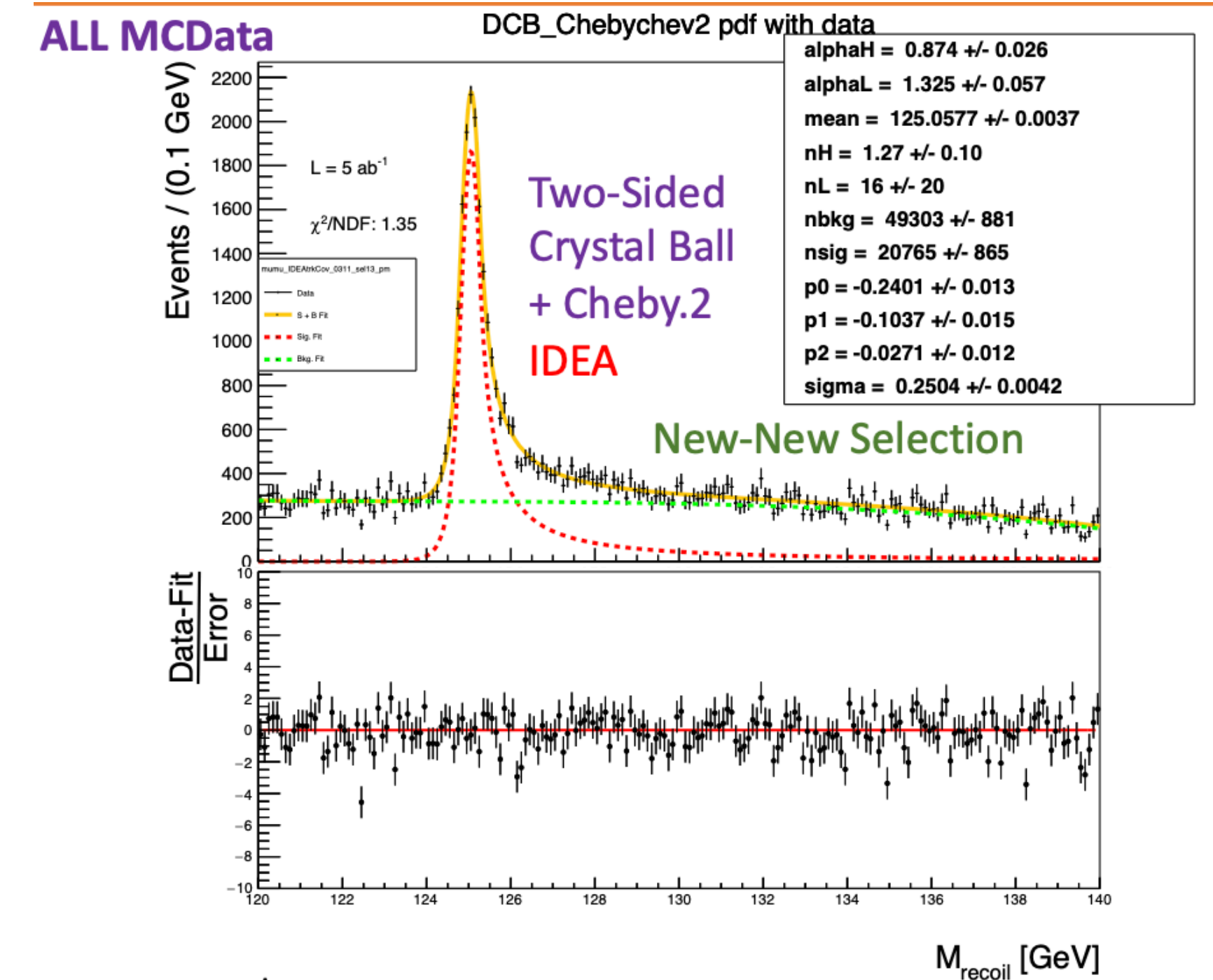
- Recent developments (still on dimuon channel), presented in FCC performance & physics meeting (https://indico.cern.ch/event/1029041/contributions/4320807/attachments/2228746/3776348/2021_04_19_FCCeePerformance_Ang_LI.pdf)

- Move to new data model
- Improved selection (similar to ILC)
 - -15% bkg, -3.5% signal

- **Selection:**

1. At least one μ^+ one μ^-
2. Z from pair of $\mu^+ \mu^-$
3. At least One Z boson,
4. $m_Z \in [86, 96]$ GeV
5. $p_T^Z \in [20, +\infty]$ GeV

- Several fits performed with signal parameters floating or fixed to understand origin of large uncertainty and biases
 - Found that fixing signal high tail parameters lead to closure and stat. uncertainty $\sim 1\%$
- Also investigated effect of beam energy spread on mH resolution: IDEA 260->380 MeV, CLD 470->530 MeV



Z->ll (ee, mumu) + H->bb/cc/gg

- Modified IDEA Delphes card to
 - Exclude isolated electrons/muons/photons from clustering of jets (which are used to reconstruct the Higgs)
 - Use jet clustering algorithm more appropriate for ee than anti-kT (currently storing Valencia inclusive and exclusive 2- and 4- jets)
 - Include parametrised c-tagging efficiencies and fake rates, similar to b-tagging
 - Efficiencies / fake rate numbers from presentation of work on c-tagging by Loukas Gouskos
- Produced various samples w/ Pythia:
 - Z(ll)H, H->bb/cc/gg/non-had
 - ZZ
 - WW
- Currently working on selection (starting from ILC and CEPC published studies)
 - Some feature to understand like very large dijet mass tail compared to ILC/CEPC plots (not necessarily a crucial feature since we fit the recoil mass, but could use m_{jj} to suppress other ZH like H->WW or tautau full hadronic)

