University of Amsterdam

Nikhef

KM3NeT

No-hit inclusion prestudy

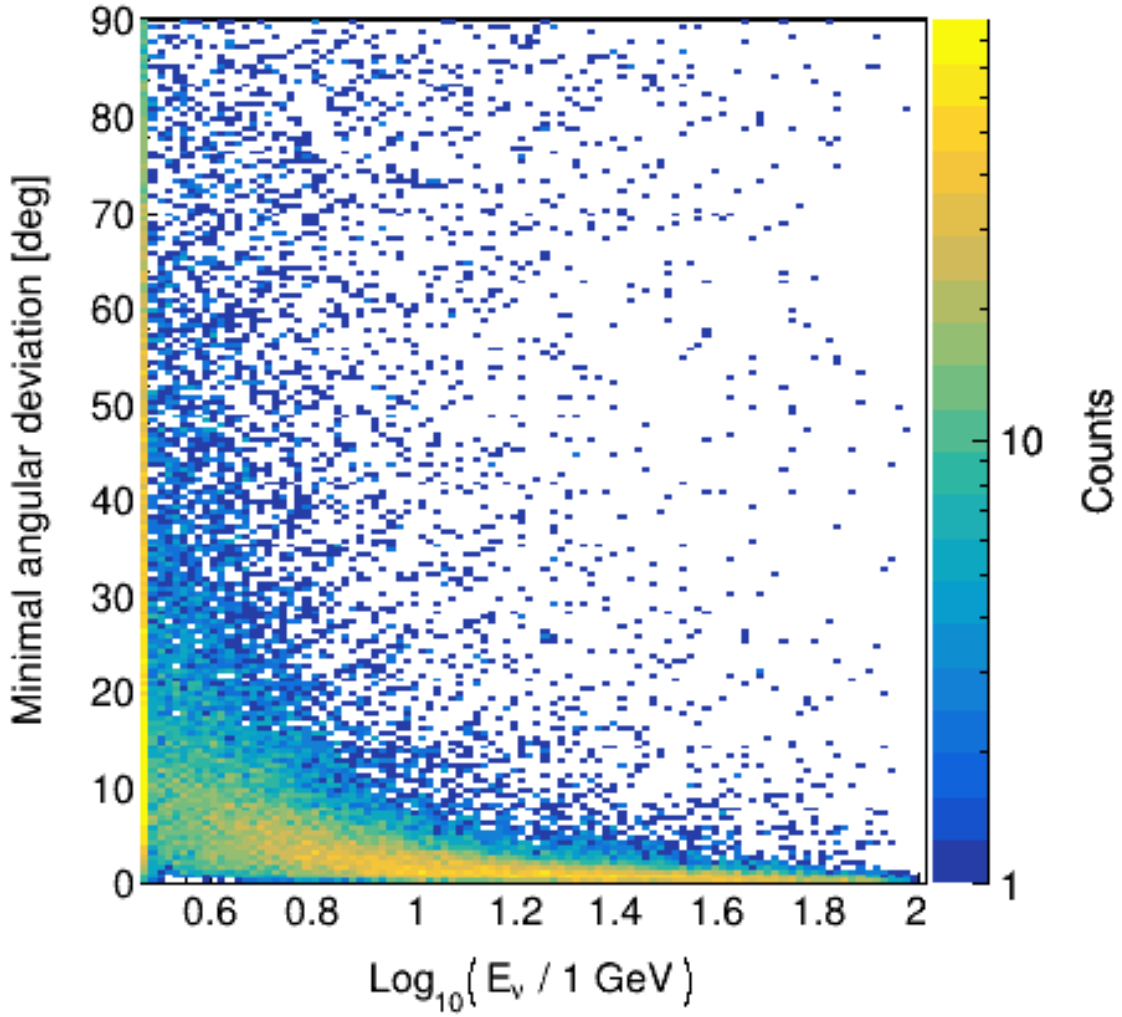
Bouke Jung (bjung@nikhef.nl) and Maarten de Jong (mjg@nikhef.nl)

Revision

- Reconstructed files used last time (from irods) were generated with the old reconstruction chain,
  - i.e. without JStart prior to JGandalf

- Last time 3-100 GeV ν_μ-CC events

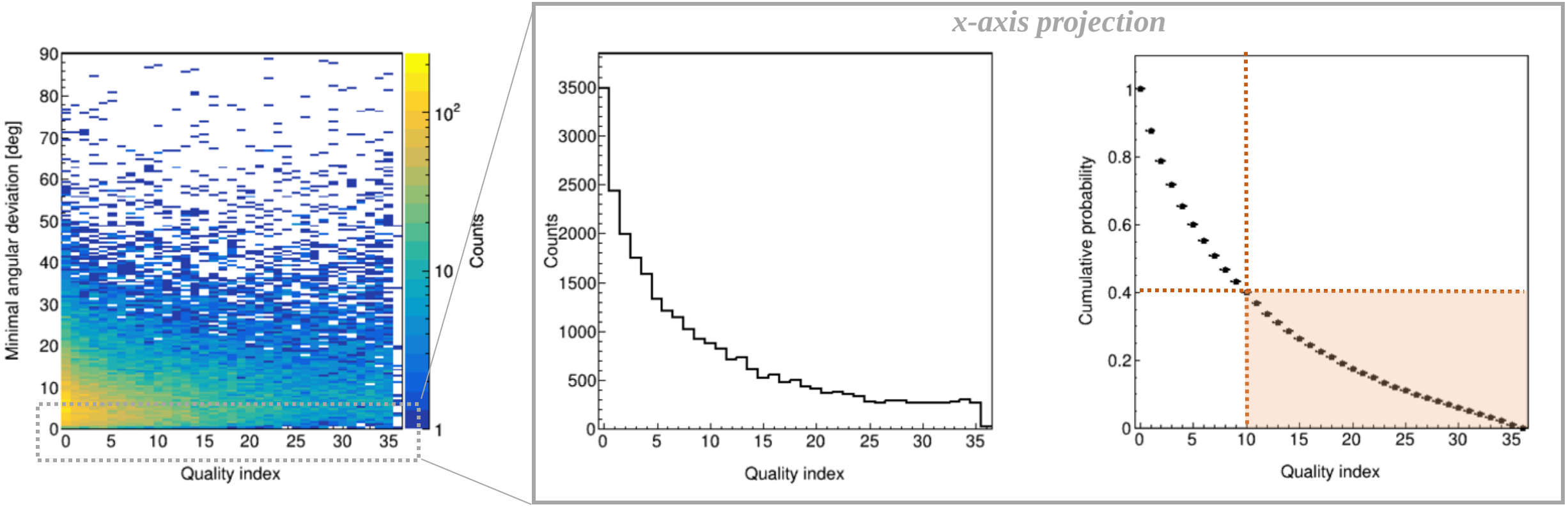
- Low energy event reco can be improved more
  --> use **1-5 GeV ν_μ-CC** events instead



Fit quality and MC-truth comparison

- Prefits with best quality (index = 0) **do not always correspond** with prefits with smallest angular deviation from MC-truth (= best fit)

- In nearly **40 % of reconstructed low-energy CC-events**, the **best fit ranks tenth or worse** in terms of fit quality



Fit quality and MC-truth comparison

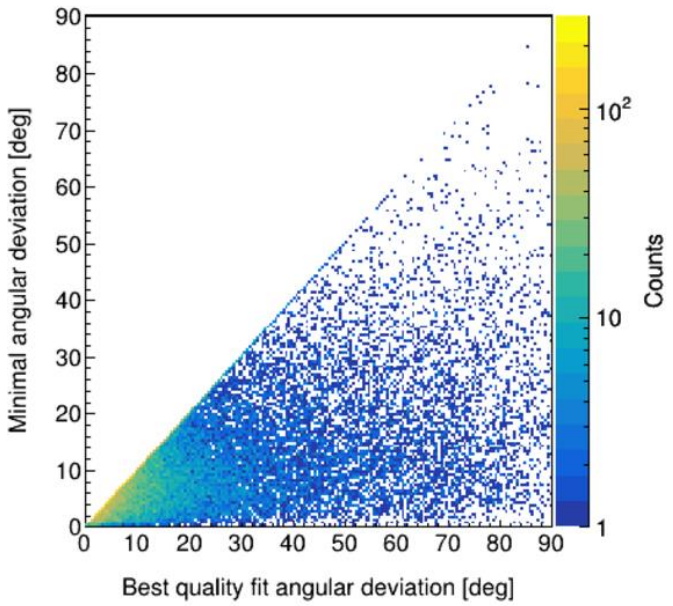
- Prefits with best quality (index = 0) **do not always correspond** with prefits with smallest angular deviation from MC-truth (= best fit)

- In nearly **40% of reconstructed low-energy CC-events**, the **best fit ranks tenth or higher** in terms of fit quality

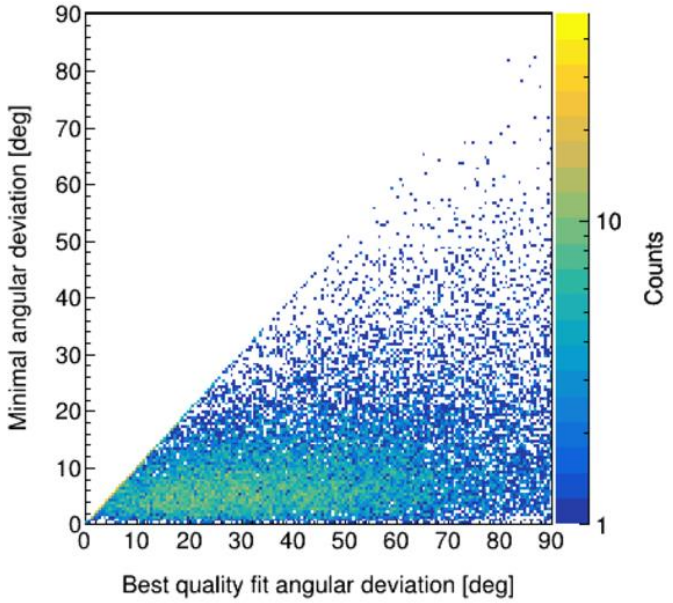
- JGandalf improves hugely on JSimplex, but there seems to be still more to gain!

  - Few degrees improvement on angular deviation might be achieved

JGandalf



JSimplex



Strategy

- Define **second fit-quality** based on integrated hit/no-hit information

- Use JMuonGandalf and JEnergy as stepping stones

  1. Loop over hits ⟹ loop over PMTs
  2. Include computation expected number of hits (using Jpp muon PDFs)
  3. Determine no-hit likelihood
     - Including threshold inefficiency
  4. Multiply hit and no-hit likelihoods

- Include monitoring tools in new application
  - E.g.: mutual cross-check track length and energy