Alignment, alignment check

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Millepede for „global" alignment
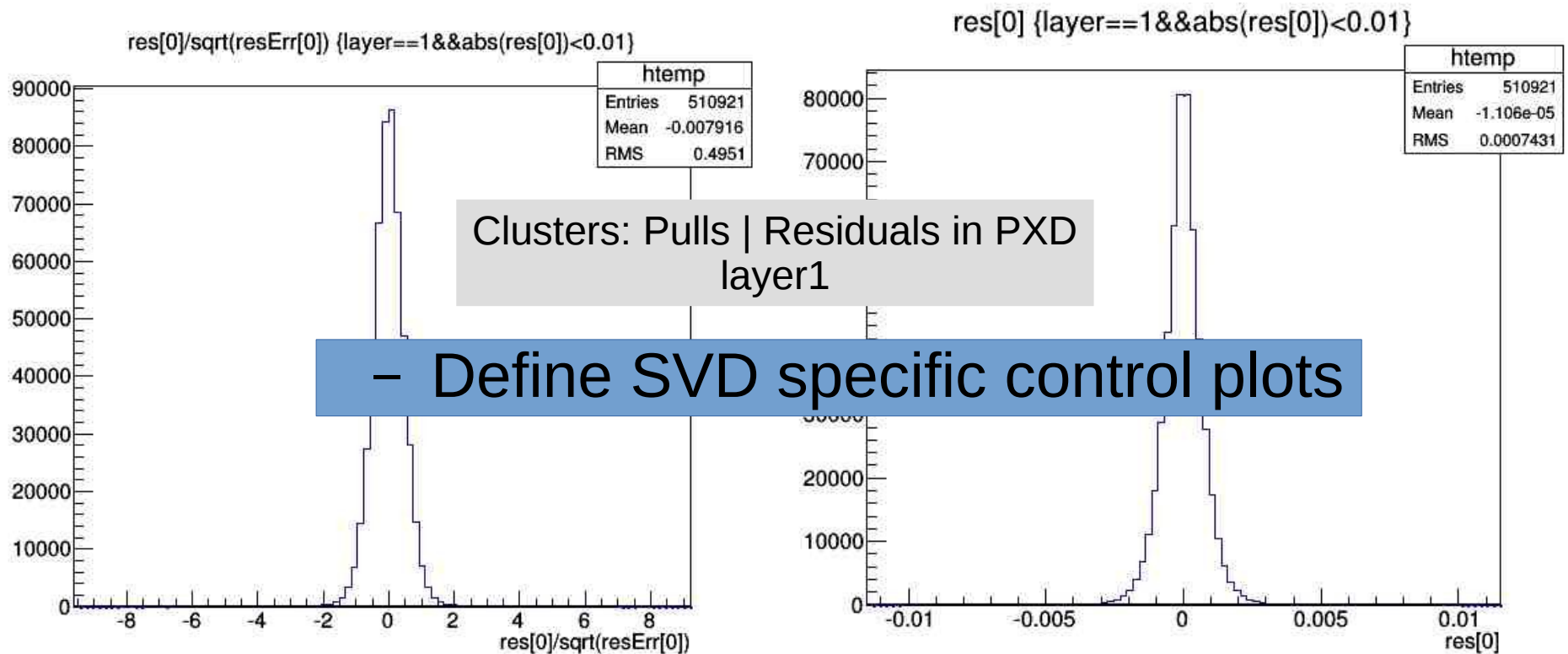
❑ Millepede II

- Implementation of the Millepede algorithm (V. Blobel, C. Kleinwort)
  https://www.wiki.terascale.de/index.php/Millepede_II

- <u>Linear</u> least squares fit for *very* large number of parameters

- <u>Key assumption</u>: 2 kinds of fit parameters
  - *Global* (= appearing in many measurements) = alignment parameters
  - *Local* (single track) parameters (only affect small subset of measurements) ... not computed

- <u>Reduces the problem to dimension equal to number of alignment parameters</u> ... then inversion/diagonalization... of much smaller matrix

- Solution in one step, no approximation (iterations for non-linearity and outliers)

- Hierarchy constraints added via Lagrange multipliers

- Used in H1, CMS (see recent paper http://arxiv.org/abs/1403.2286) ...

- Fitting with General Broken Lines – integrated into GENFIT2 and basf2 -->see GBLfit module

Alignment Validation/Check

- Working on „low level" validation plots
  - P-values, chi/ndf
  - Residuals/pulls at (which?) layers

Clusters: Pulls | Residuals in PXD layer1

  - Define SVD specific control plots

Calibration Framework + Validation

- Millepede Alignment module as first example soon

- Millepede is detector independent

  – Detector dependent validation and calibration methods needed

- Millepede can run SVD alignment standalone, but the development will focus on global calibration (PXD+SVD+CDC+?)