Low-P : implications for beam background

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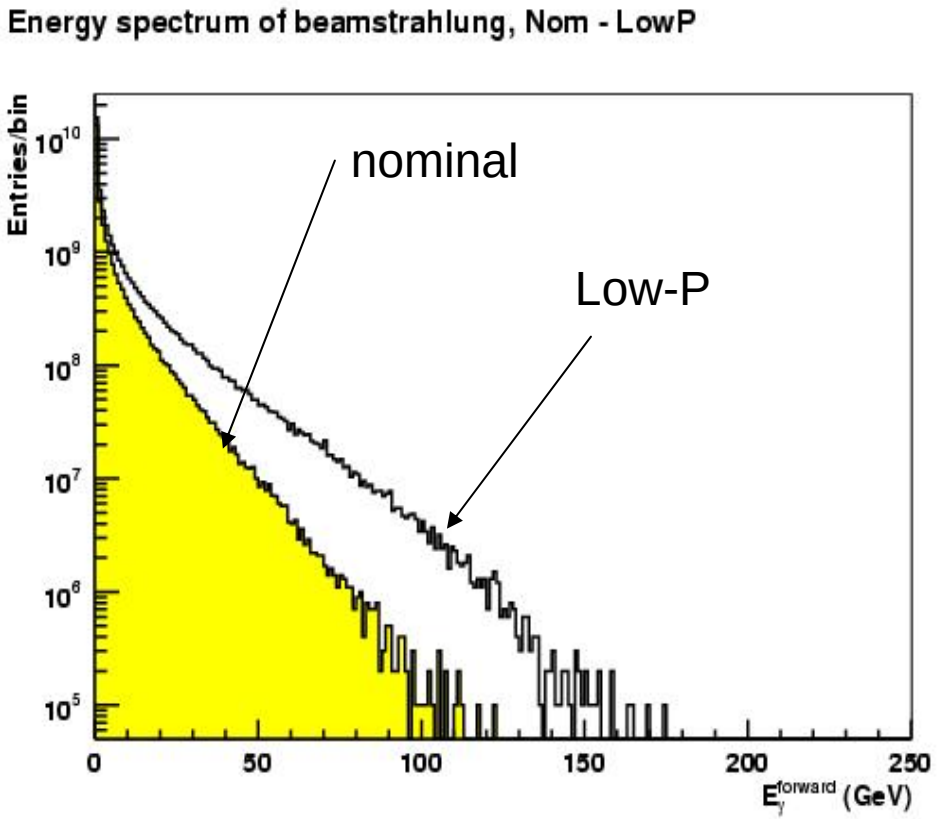
Thanks to Wolfgang Lohmann (MDI panel meeting 9/20/06)

Parameters

	Nominal	Low-P
Nb	2 E10	2 E10
σx/y (nm)	543/5.7	452/3.8
σz (μm)	300	200
Dy	18.5	27
δBS	2.2%	5.7%

Same luminosity

Luminosity Spectrum



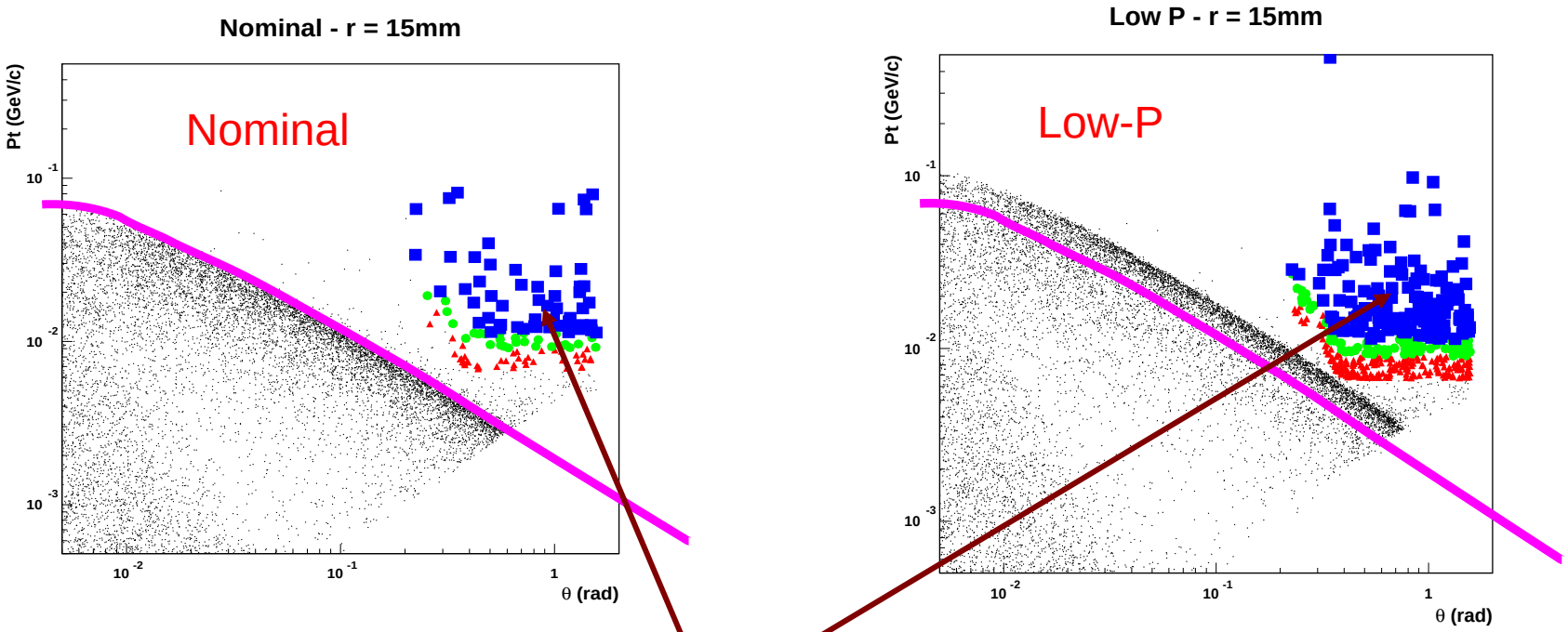
- Beamstrauhlung energy
  - Nominal:
    - 1.16 E11 GeV/bX
  - Low-P:
    - 2.94 E11 GeV/bX
- Impacts high-precision mass measurments
  - Top threshold scan
  - Higgs recoil mass...
- How much impact?
  - TPC resolution of σ(1/p) ~5 E-5 becomes non-dominant (1.6 times worse σMhiggs)

Pair background

- Very naively,
  - **Background on a given event (assuming bunch id)**
    - determined by hits per bunch crossing
  - **So, if pairs ∝ luminosity,**
    - Background hits ∝ bunch luminosity
    - Namely, Low-P background ≈ 2× nominal background
    - '2×' applies to all backgrounds proportional to luminosity
      - Two-photon, radiative Bhabha, debris ...
- For pairs, effects can be more than ×2
  - **Pt of the pairs ∝ E field on the surface of bunch**
    - Pt is ~1.5 times larger for Low-P than nominal
    - More pairs hits the detector

Pair background

Pt vs polar angle of pairs



Hits on vertex detector

Thanks to Cecile Rimbault

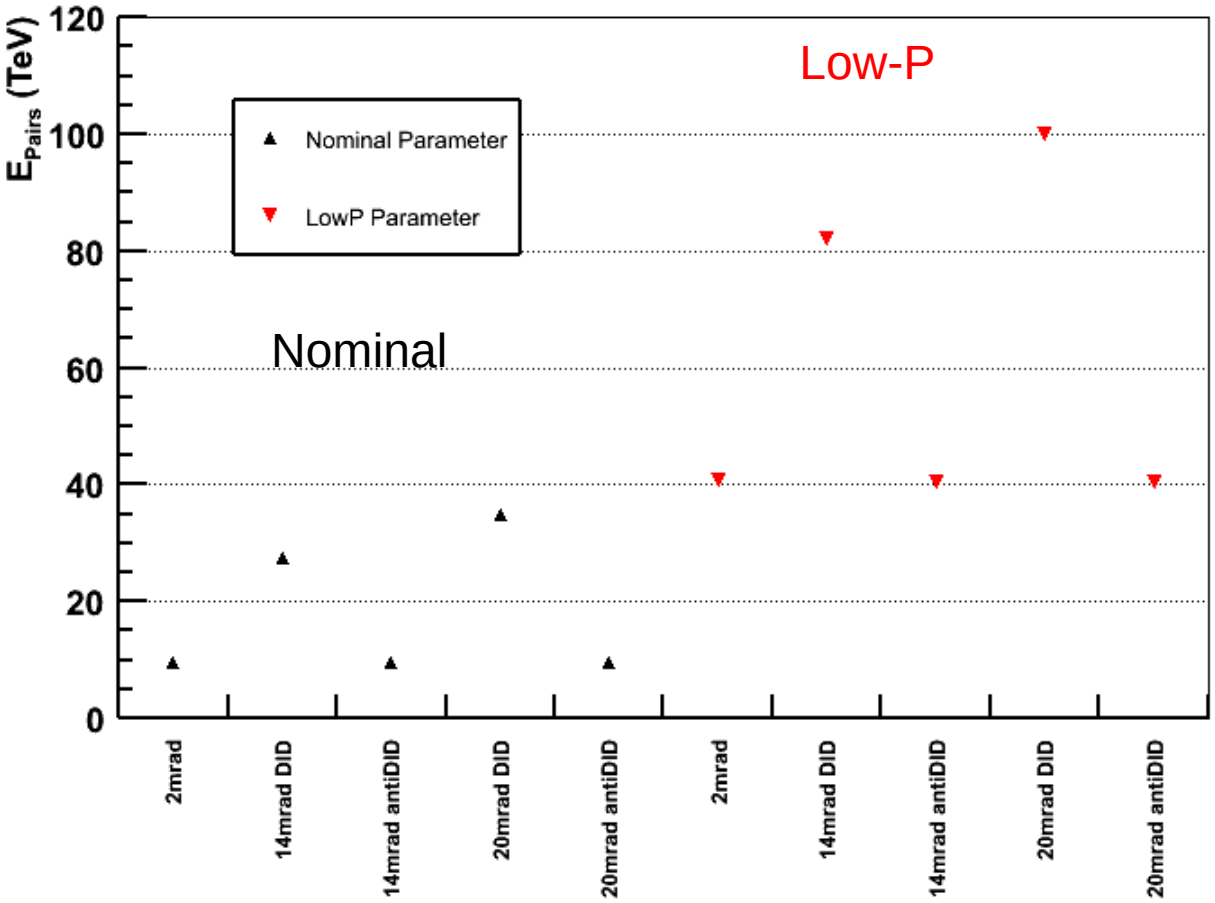
Pair background

Energy deposition on BEAMCAL

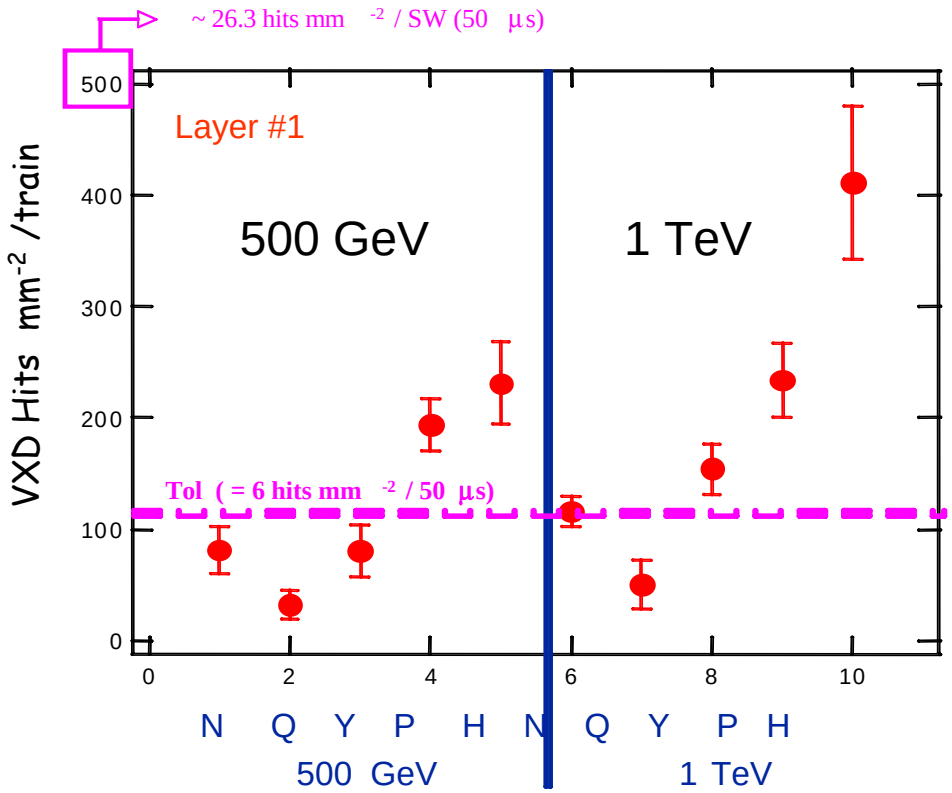
Stau search for 14 mrad with anti-DID

Nominal : ~40% lum. Loss for stau search

Low-P : ~ lum. loss of more than x2



Pair background



K. Buesser, T. Maruyama, W. Kozanecki, etc.