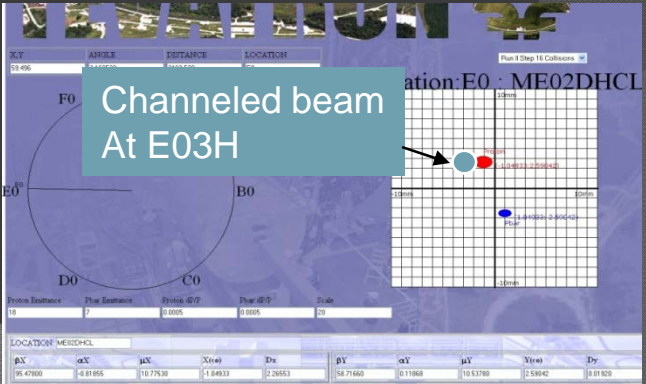
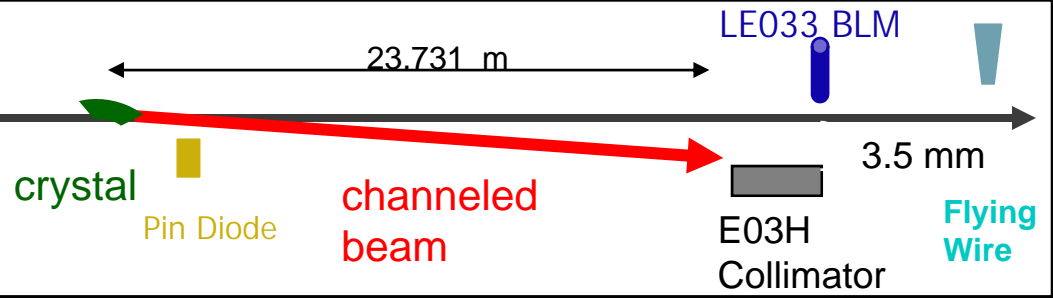
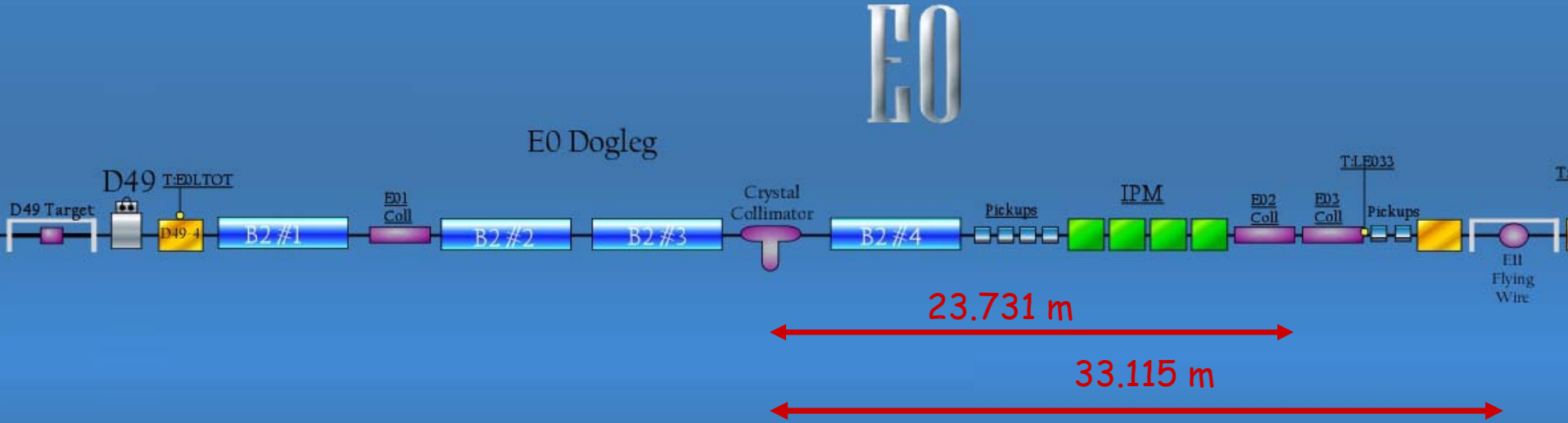


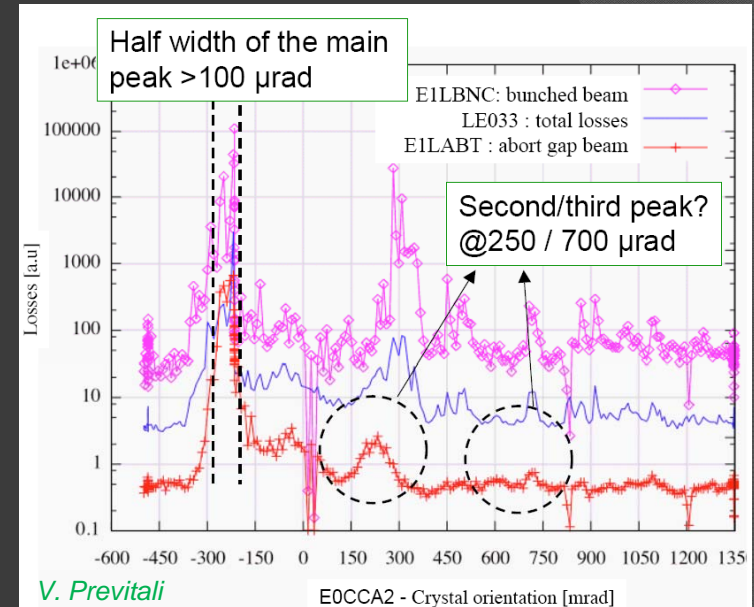
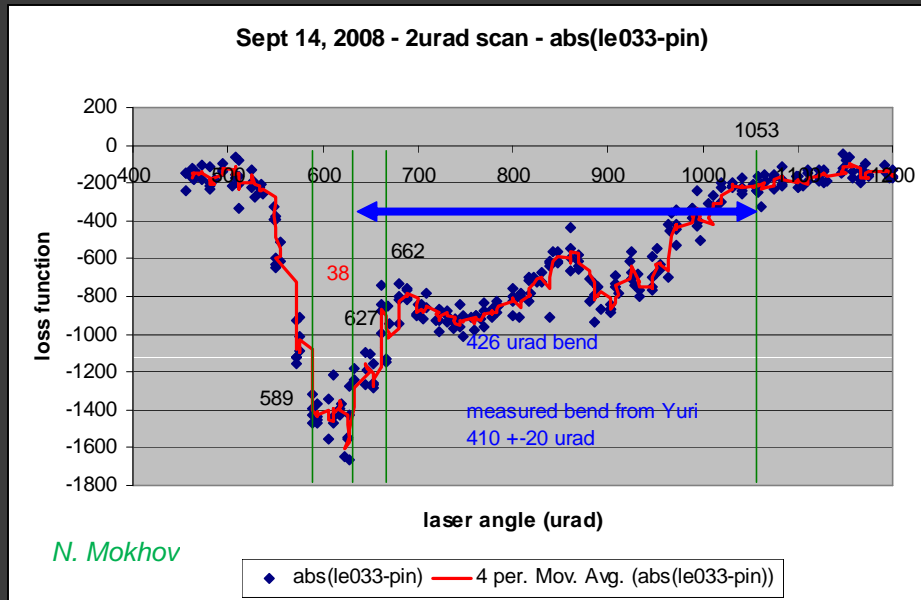
G. Robert-Demolaize, 4th Crystal Channeling Workshop, CERN, 24-27 March 2009

T980 EXPERIMENT SIMULATIONS AND STUDIES IN 2010-2011

T980 layout



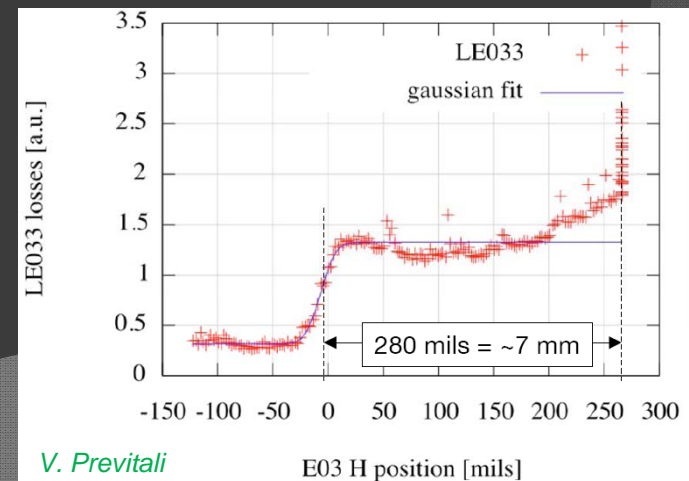
End of store studies



EOS studies performed at FNAL by V. Previtali & D. Still showed a broader channeling peak (crystal scan) and a smaller channeling displacement (transverse collimator scan)

⇒synchrotron motion ??

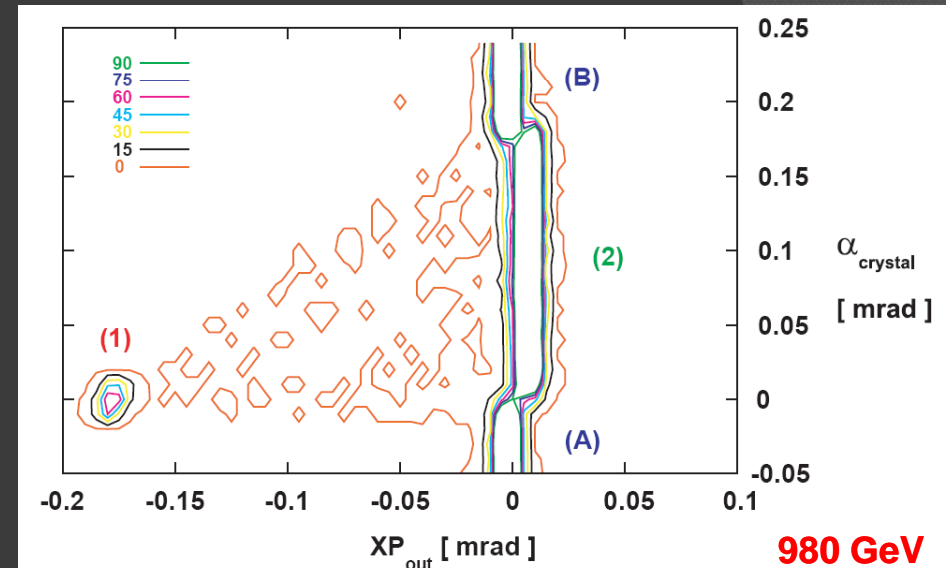
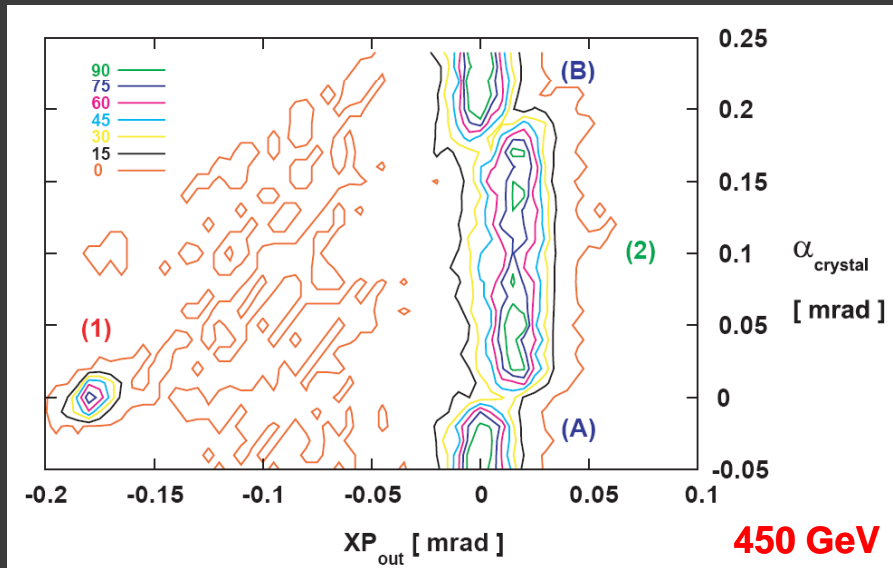
⇒miscut angle ??



Goals for T980

- ⦿ A crystal experiment at Tevatron should allow:
 - confirming the **energy scaling laws** when comparing data from UA9 experiment (need equivalent beam conditions for identical crystal);
 - check for **specific multi-turn pattern**, i.e. how big of an effect the synchrotron motion is: this should improve our understanding on why most of channeled particles in Tevatron come from the abort gap;
 - study the **loss patterns**, not only close to the collimation area, but all around the ring too to get a benchmark comparison with/without crystal.
- ⦿ The use of a crystal-based collimation system relies on our understanding of the physics of bent crystals => **off-line studies require simulation codes as well as data analysis codes: using the data we get is equally as important as actually getting it !!**

Crystal scaling laws

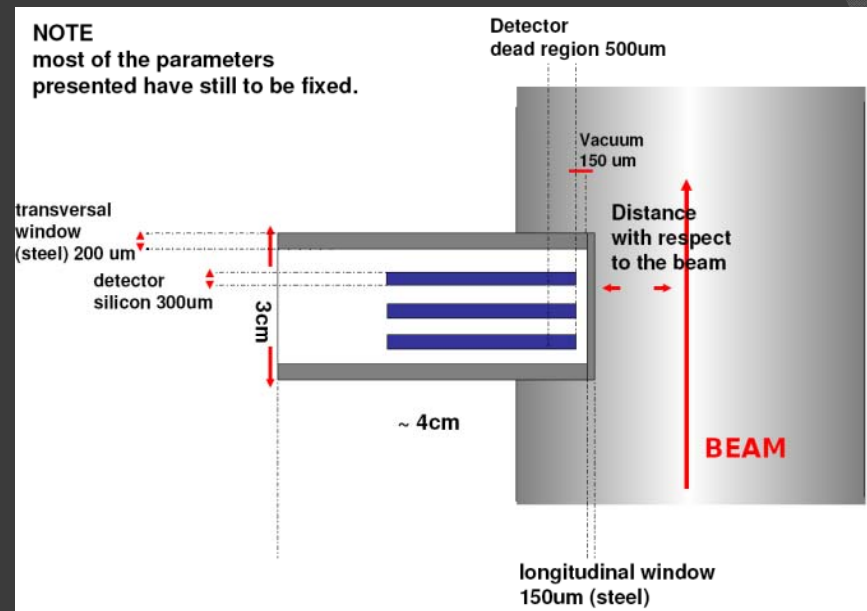
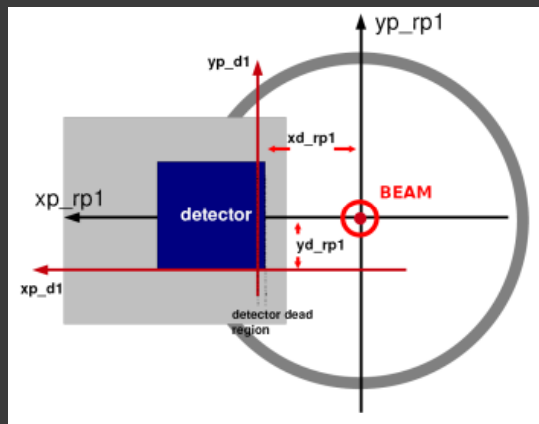


- CATCH simulations: (1) = channeling ; (2) = volume reflection ; (A, B) = amorphous kick.
- To be tested between UA9 and T980:
 - channeling angle is independent of energy
 - VR kick amplitude gets closer to amorphous behavior

=> crystal characterization with beam is required !!

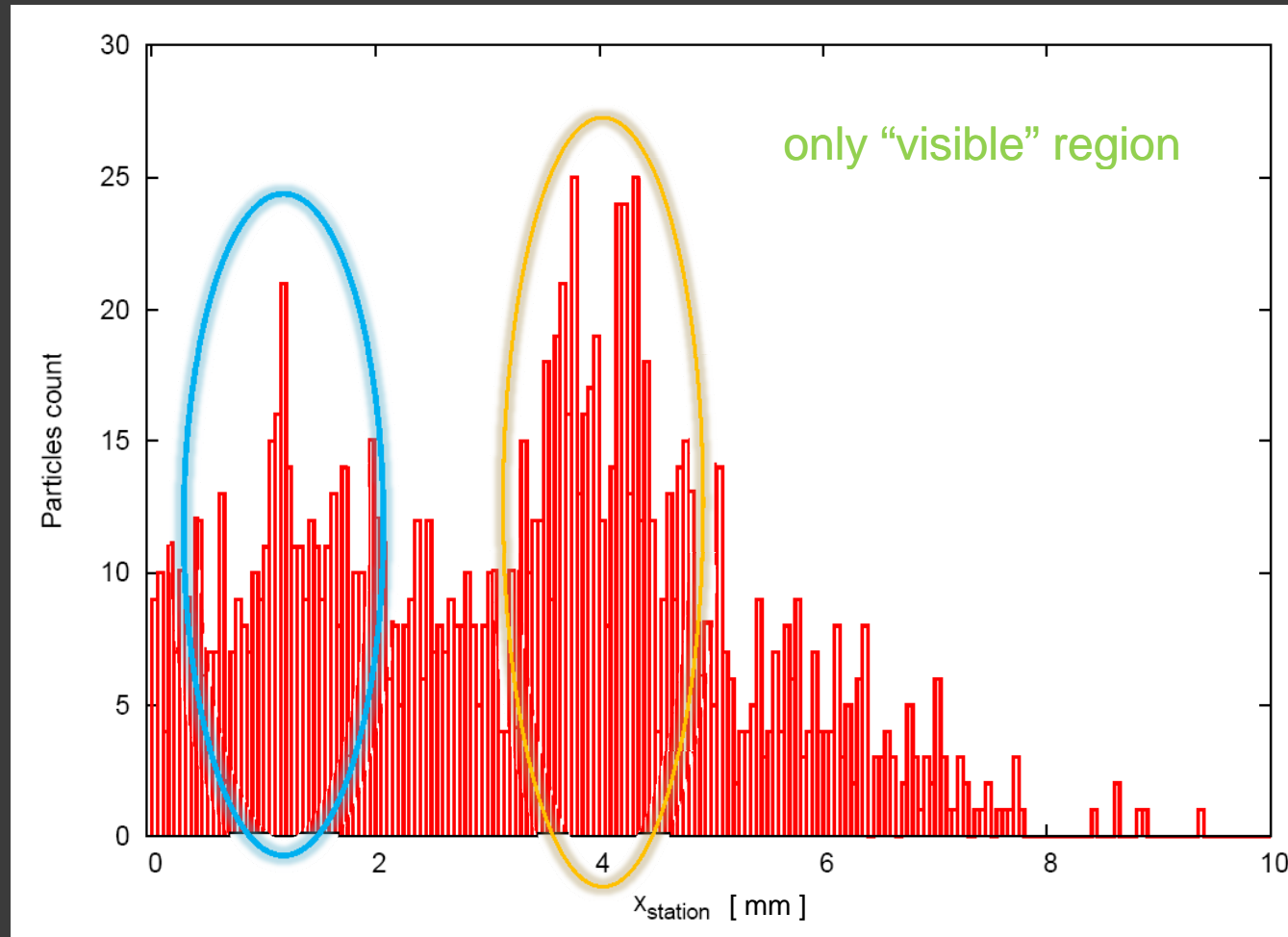
ROMAN POTS LAYOUT

S. Hasan et al.



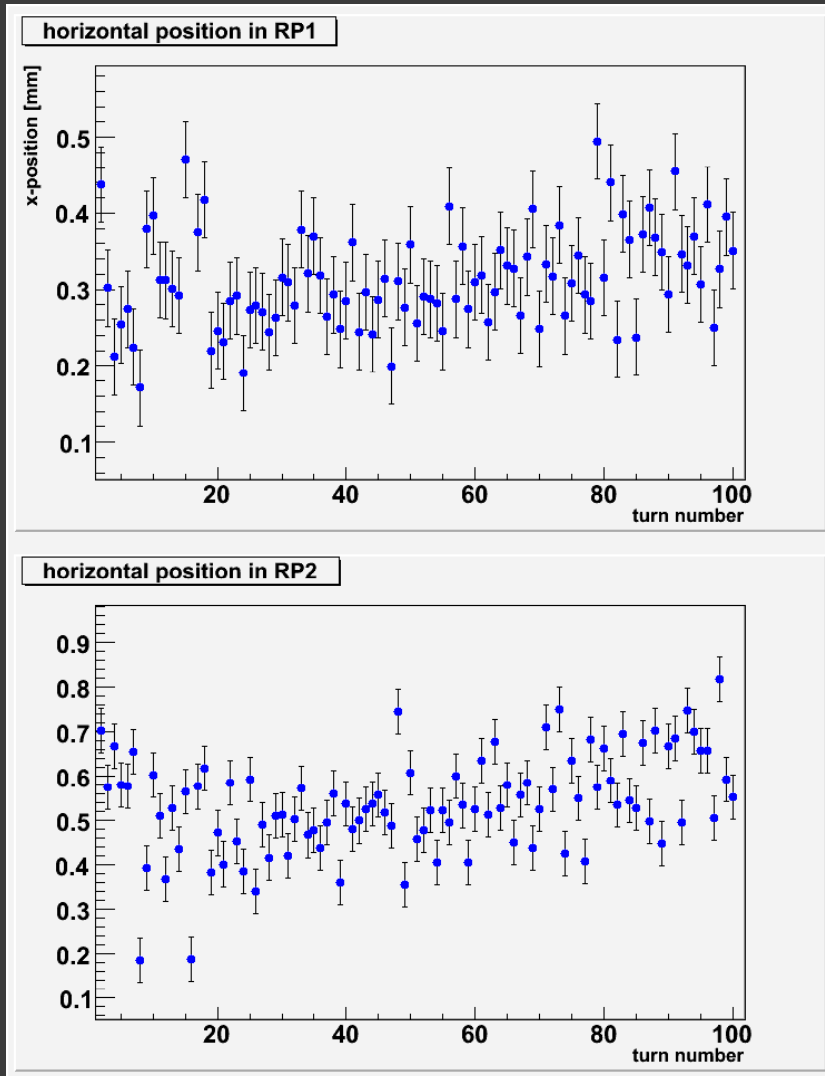
- Total detector dead zone size for each RP has to be compared to local beam size: the halo diffusion rate is a critical parameter, as it determines if we are “blind” (either too few or too many particles seen).
- Dead zone must be included in all algorithms, simulation and data analysis; **dE/dx** and **RMS kicks** from passage through RP material has to be taken into account when studying full 6D patterns.

HITS ON RP1



Readout from the detector is one position: **which one ??**
=> raises the issue of the particle flux !!

FIRST DATA ANALYSIS



- Using the common output format agreed upon with [M. Prest et al.](#), one can generate files reproducing the [readout from the electronics of the detection station](#) - incl. the [near crystal detector \(cerenkov\)](#).
- Assumption are being made on the triggering mode of these detection stations; [one of the issues with synchronous triggering is the case of a crystal near-miss !!](#)
- Goal of the turn by turn data: [recognize hitting patterns of single particles](#).

Open discussion...



- Install additional electronics ?
- New crystal support/goniometer/motor control for study of torsion ?
- New type of crystals: multi-crystal (“piano”), surface gap...
- We need a regular collaboration meeting...