



LHC Study Working Group

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Crystal collimation of Xe beams (MD 2728)

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Acknowledgements: J. Jowett and the ion team



The presence in 2017 of **Xe beams in the LHC**, presently being discussed, would provide unique opportunities for accelerator physics studies at high energy with these beams.

We propose to test for the first time **crystal channeling and crystal collimation cleaning** at unprecedented energies. In addition to these results, this MD also has the merit to provide **reference experimental data for future simulation of complex codes**. Only Pb data are presently available for the LHC energies. One more data point provides invaluable data for code benchmarking. This is in particular true in light of the results achieved in 2016 at 6.5 Z TeV, which are not fully understood yet.

Procedure: same as the well-established procedures already executed in previous MDs (LHC MD672: Crystal collimation with ion beams).

Tests at injection followed by tests at flat top, using standard machine configurations. Re-arrangement of collimators/crystals in IR7 at top energy. Use some ~30 pilot bunches, below setup beams. ADT blow-up for controlling loss rates. Crystal angular scans and scraping of channeled halos with collimators downstream. Loss maps with a crystal-base system compared to the standard system.

From the uploaded MD request

Beam energies:

- Injection
- Flat top

Optics: Standard

Optics change: No

Orbit change: No

Collimation change: Yes

RF system change: No

Feedback change: No

What else should be changed:

Are parallel studies possible?: Yes

More information on parallel studies? Possibility to perform monitoring of beam properties during a few hours in coast at top energy, requested by the ion team

MD requester is ready? Yes

Beam parameters

Bunch intensity (10^{11} ppb): 0.1

Number of bunches: 30

Transverse emittance (μm): 1 - 2

Bunch length: 1

Comments:

- Usual multi-pilot setup.
- Parallel study: parameter evolution of Xe beam requested by John.
- No special requests on beam quality.
- Requested time: **12h**



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 - Record energy for channeling, if achieved;
 - A reference point to understand the scheme;
 - Reference data for future simulation tools.



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 1. Physics run with Xe confirmed
 - 12h request after setting up the cycle for physics.
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- ☑ In either case, advance time from MD4 and have it as “floating”