Ways to overcome MSD aperture problem

1. Better control of orbit in point 6
2. Improve 10% kicker waveform envelope (overshoot, tolerances, energy tracking etc.)
3. Use TCDS to protect against ‘missing MKD module’ fault case as well as sweep
4. Enlarge MSD vacuum chamber

Where do these changes help?

	450 GeV circ	450 GeV extr	7 TeV extr
Better orbit	✓ ✓	✓ ✓	✓ ✓
MKE overshoot		✓ ✓	✓
TCDS for missing MKD module		✓ ✓	✓
MSD chamber	✓ ✓	✓	✓

Most critical

Things that need to be defined/answered now so that we can finalize the extraction (I).

Orbit/beam size.

- What can we assume as the *nominal* stabilized orbit in 6?
- For various machine faults, *how far* (in mm) can the beam move away from this nominal in point 6 before the dump receives the trigger?
- Can we *safely* assume that machine faults and dump faults (missings) are not correlated?
- Can beam emittance grow *undetected* prior to dump?

MKD waveform envelope

- Of the 10% total overshoot, can the 8.6% due to the MKD circuit be taken as a realistic maximum?
- Is the present assumption of +/- 0.5% for the energy tracking *system* correct?

Things that need to be defined/answered now so that we can finalize the extraction (II).

TCDS

- *How many protons* can the TCDS stand for the missing MKD module case at various energies?
- Does a double-sided TCDS help (*probably not* unless to protect from small energy tracking error at near-injection energy – we don't want to hit it on every extraction).

MSD vacuum chamber…

- What aperture do we need, once the above parameters are fixed?

  Note: change to baseline = new technical study + money + MY…

Summary of questions for MPWG

- What to assume as the *nominal* stabilized orbit in 6?
- *How far* (in mm) after a fault the beam moves before the dump trigger?
- To what extent can the *emittance grow* undetected prior to dump?
- Is assumption justified to *decouple* machine faults and dumps faults?
- Is energy tracking system tolerance of +/- 0.5 % realistic?