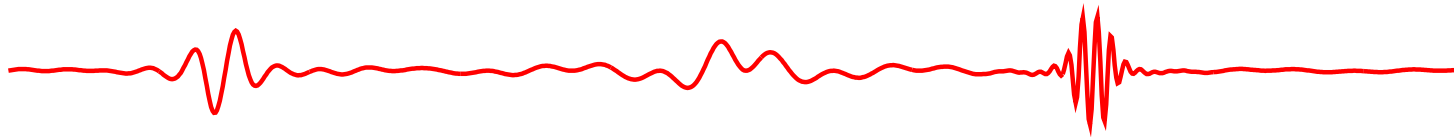


Towards collision tunes at injection



Rogelio Tomás, Andy Langner

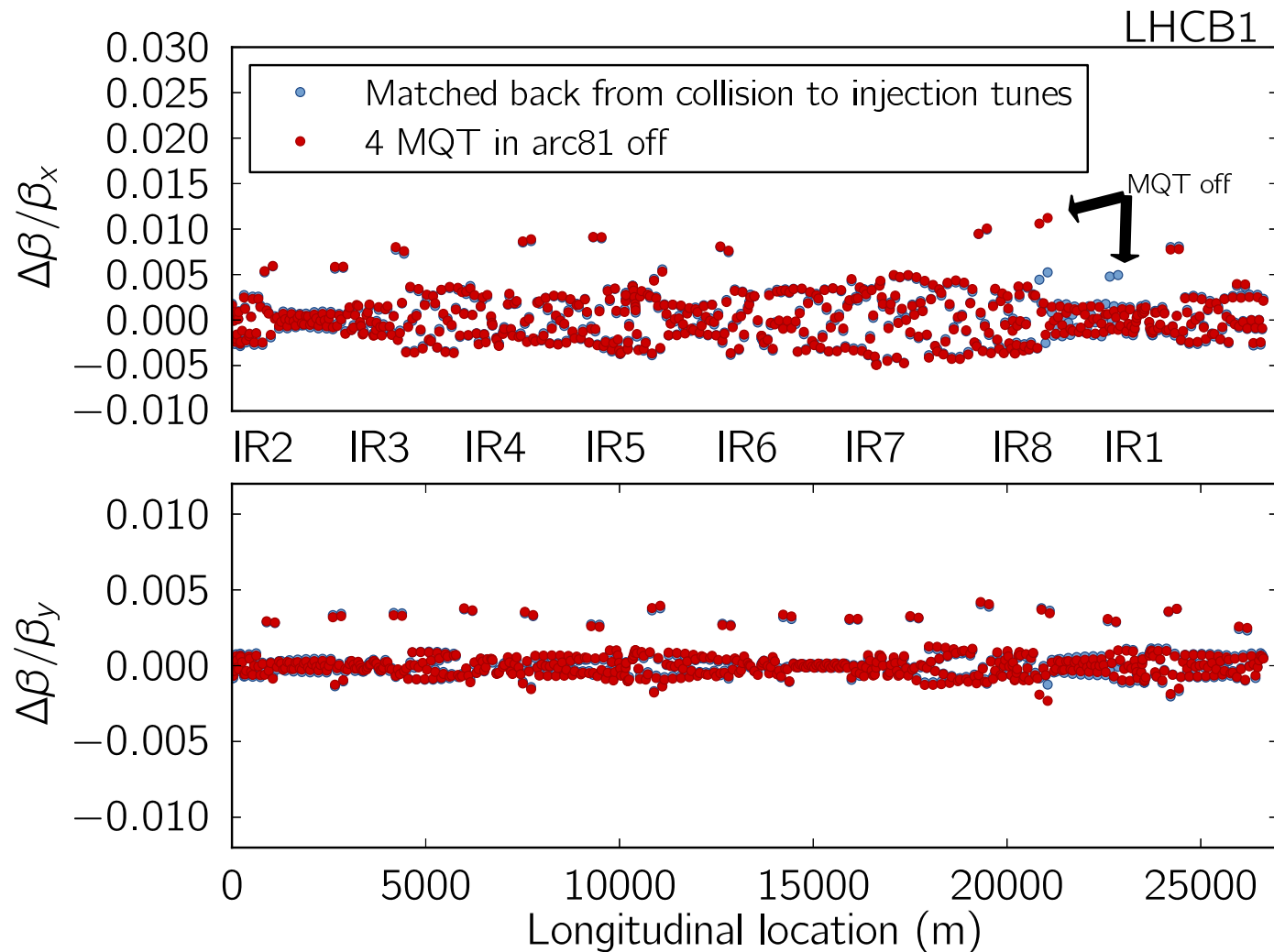
Thanks to Stephane Fartoukh, Massimo Giovannozzi and
Jörg Wenninger

May 2014

Motivation

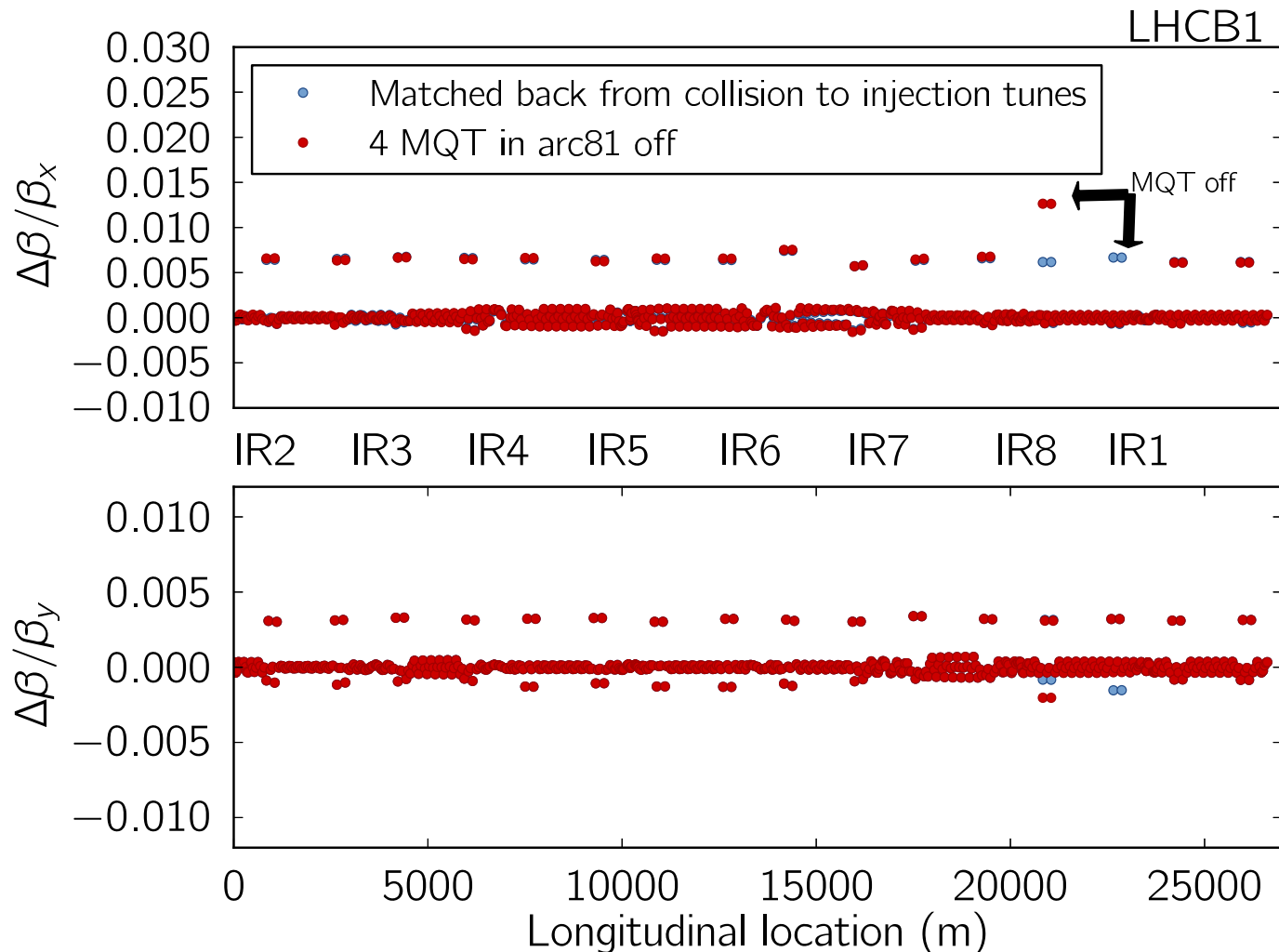
- ★ Tune jump is too violent, solutions:
 - Lengthen the tune jump (lowers performance)
 - Collision tunes from injection (1st step of **ramp&squeeze** → **save >12min/ramp**)
- ★ J. Wenninger: “...[for collision tunes at injection] we need a better Q signal. Maybe things are better after LS1”
- ★ Suggested strategy for largest flexibility:
Use collision optics from injection and use MQTs to change tunes to the appropriate value when appropriate

β -beating from tune jump with MQTs



Less than 1% β -beating

ATS β -beating from tune jump with MQTs

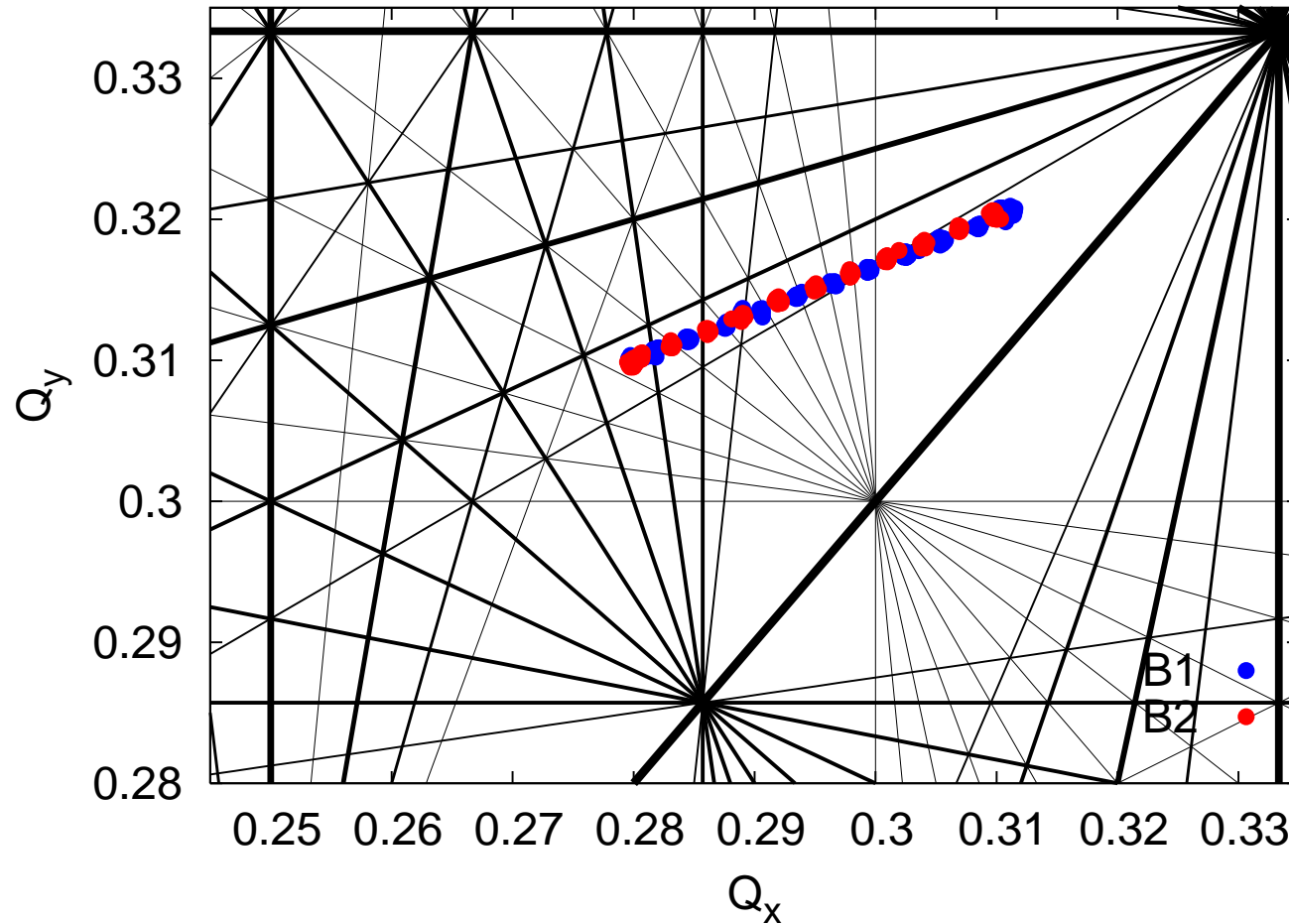


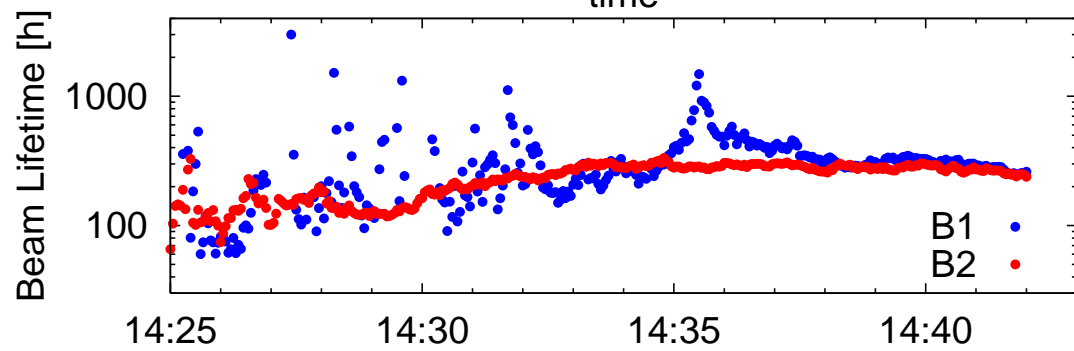
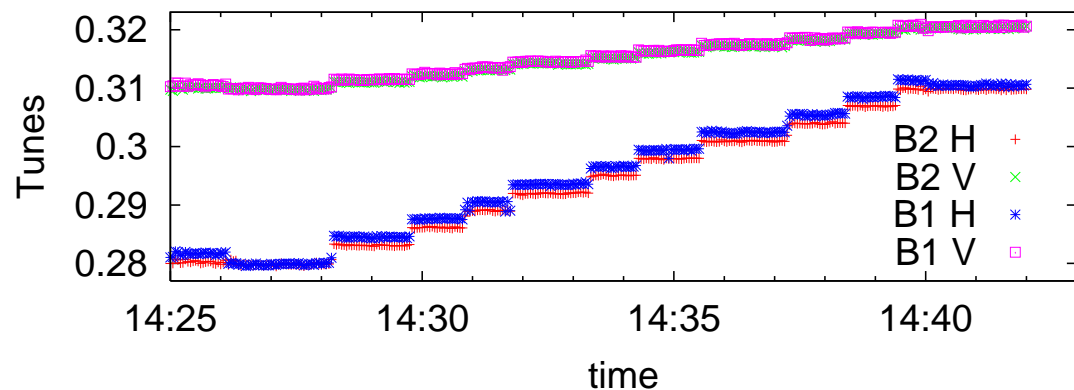
Less than 1.5% β -beating with ATS,
and $\approx 0\%$ outside of MQT pairs!

The 2011 experiment

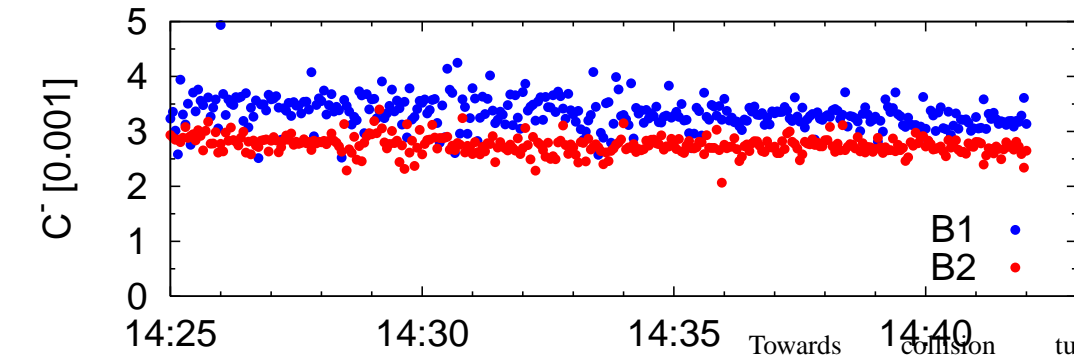
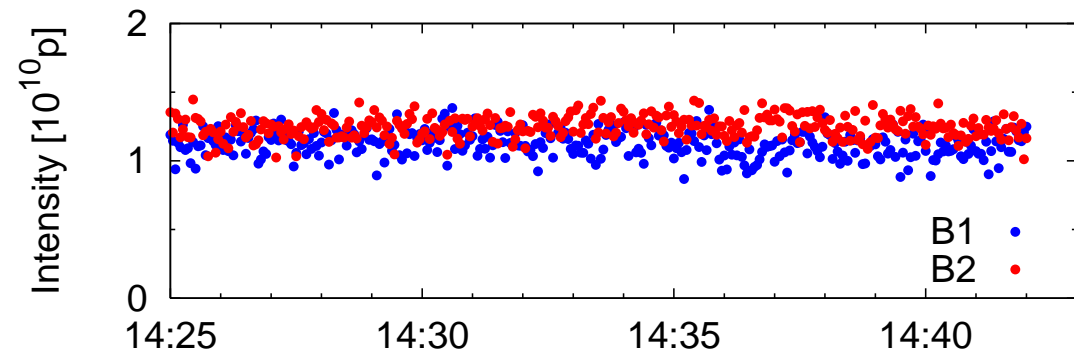
CERN-ATS-Note-2011-034 MD

Tune scan at injection

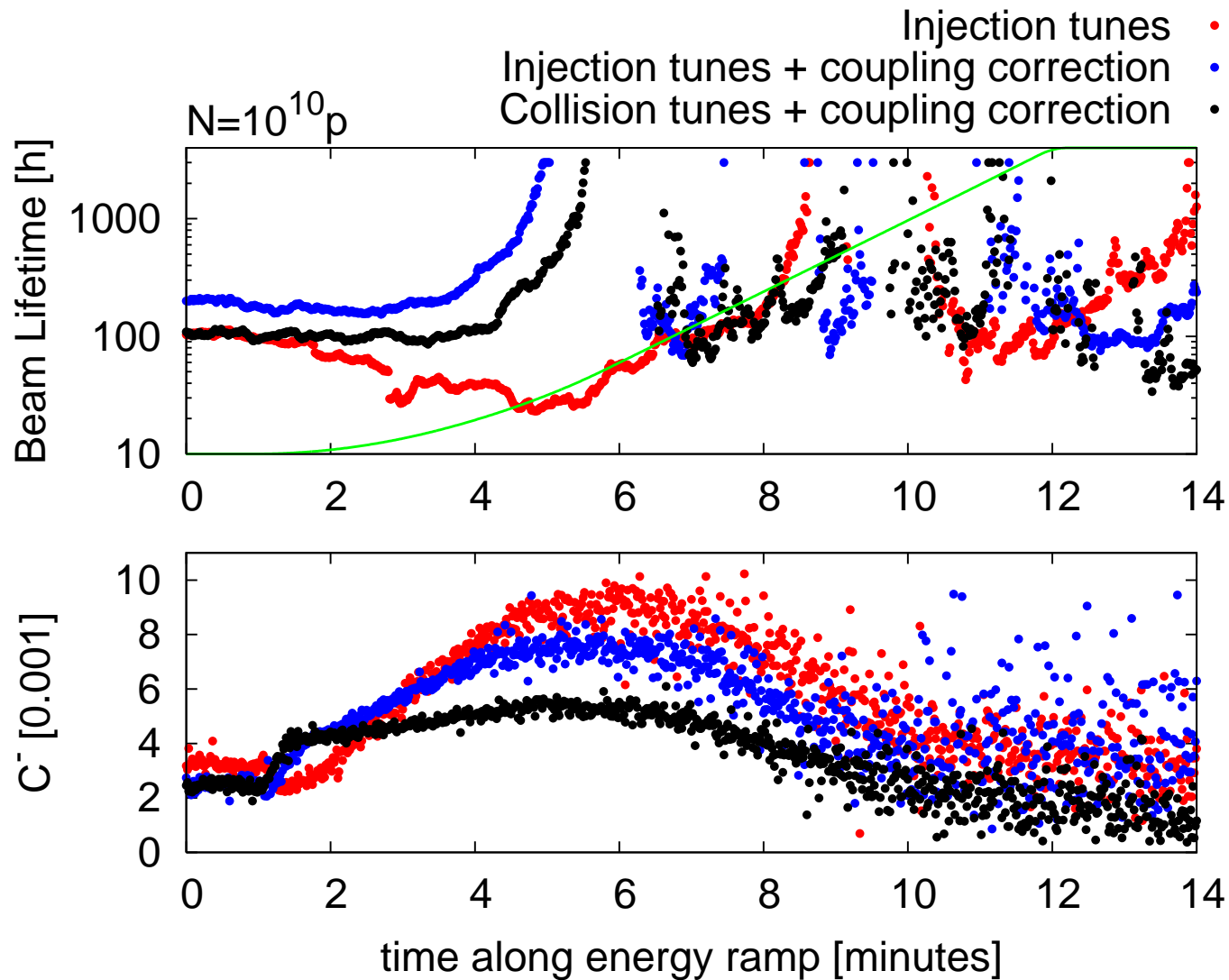




Everything OK!



Ramps with 10^{10} protons

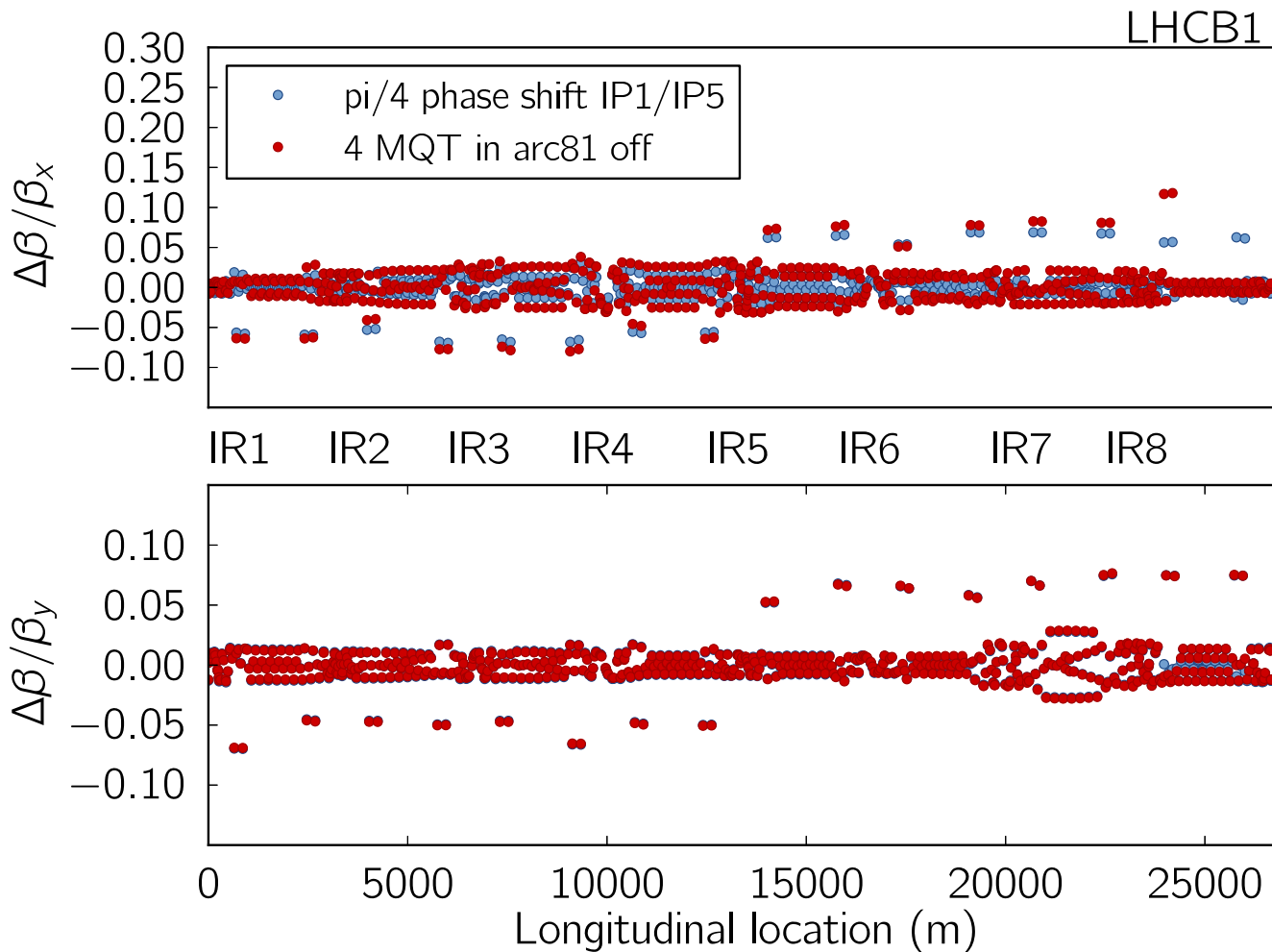


Collision tunes OK for the ramp!

Suggestion

- ★ Commission collision optics from injection (which β^* ? 11, 10, 9 m?)
- ★ Measure also with old injection tunes
- ★ Assess asap if tune and coupling control is good enough for collision tunes
- ★ If not, find best new injection tunes and best time and rate to switch to collision tunes
- ★ *ramp&squeeze in 2016?*

The potential of MQTs with ATS



Phase shift between IP1 and IP5 of $\pi/4$ yielding only 4% β -beating with ATS (out of MQT pairs).