
Bunch-by-bunch beam losses and collision patterns

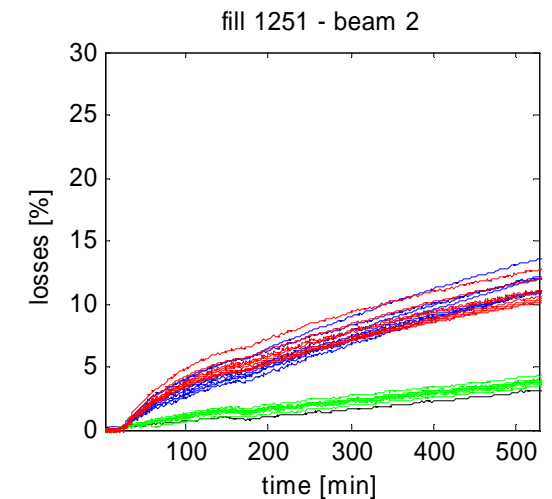
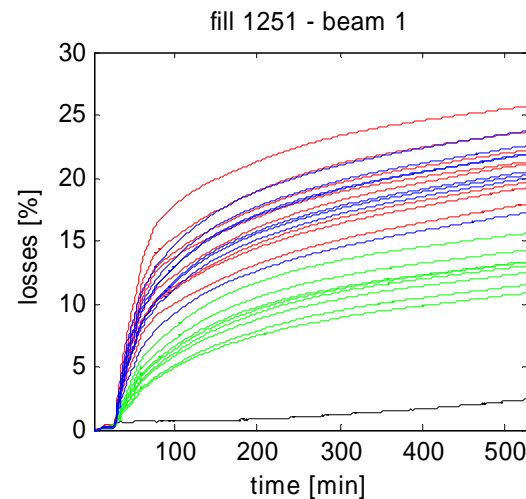
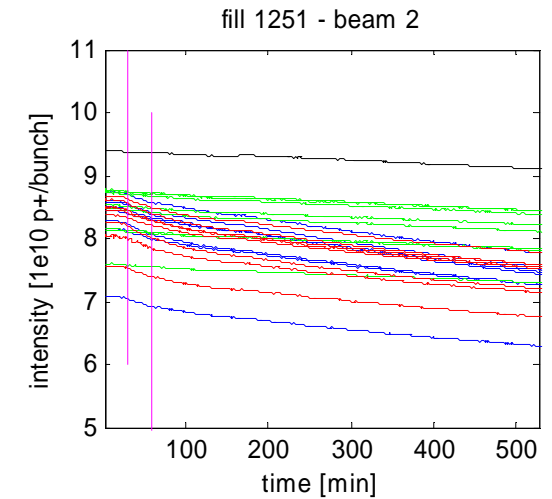
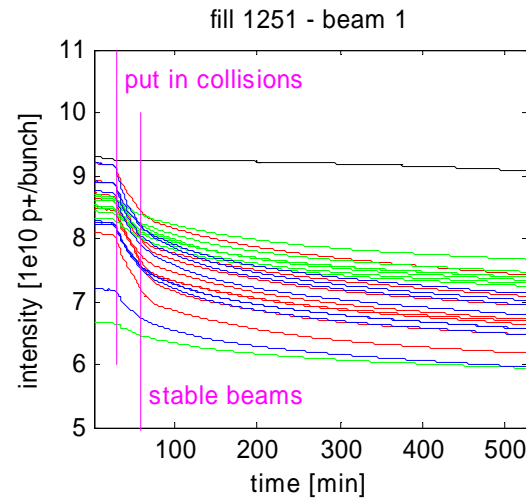
G. Papotti (observations)
and W. Herr (conclusions)

Introduction

- aim: relate bunch-by-bunch losses to collision patterns
- color coding:
 - black for witness bunches (zero collisions)
 - red for bunches colliding in IP 1, 5 and 2 (3 collisions)
 - blue for bunches colliding in IP 1, 5 and 8 (3 collisions)
 - green for bunches colliding in IP 2 and 8 (2 collisions)
- look at intensity bunch-by-bunch
- calculate percent loss
 - reference: 1st point of acquisition
- expected burnoff: $\sim 0.5e9$ /collision after 500 minutes

Fill 1251

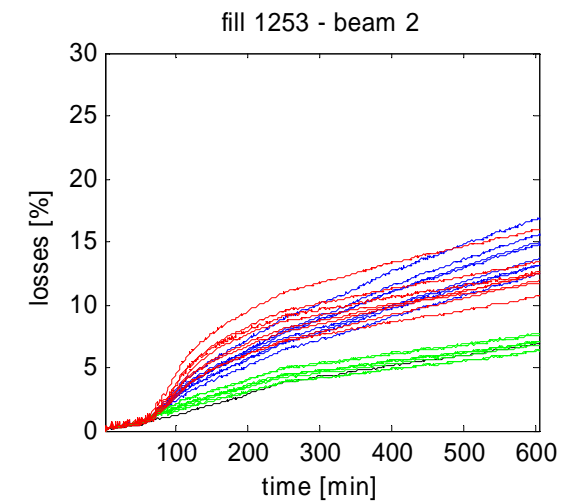
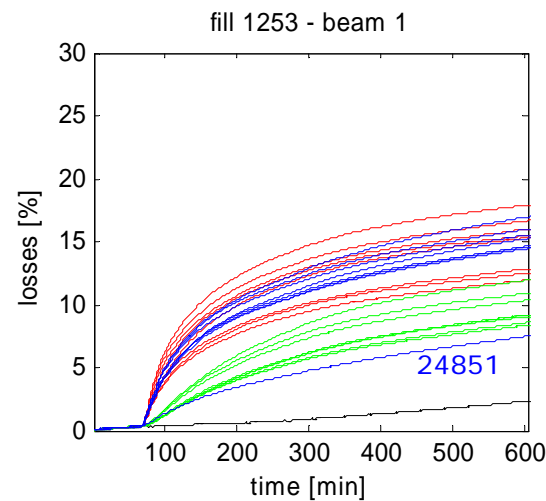
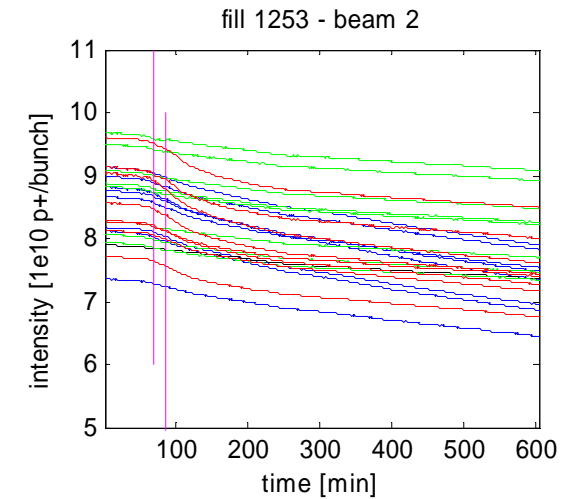
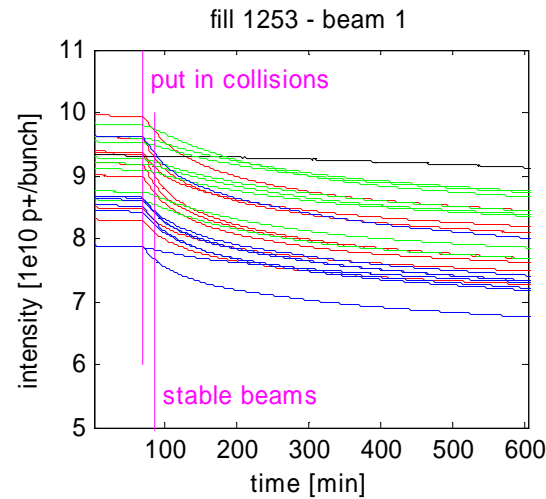
- 8 hours of stable beams
 - first 25+25
- losses start at collisions
- b1 loses more than b2
 - different loss rate shape
- “families”, depending on collision pattern
- witnesses: no losses



IPs: 1 5 2 - 1 5 8 - 2 8

Fill 1253

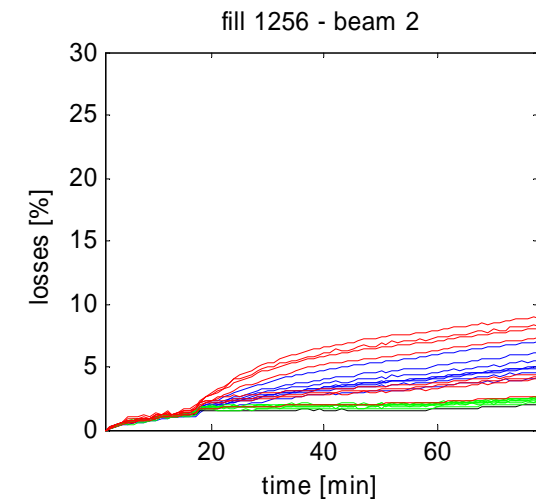
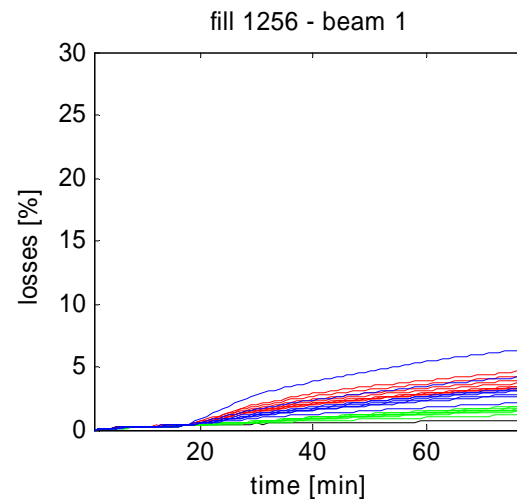
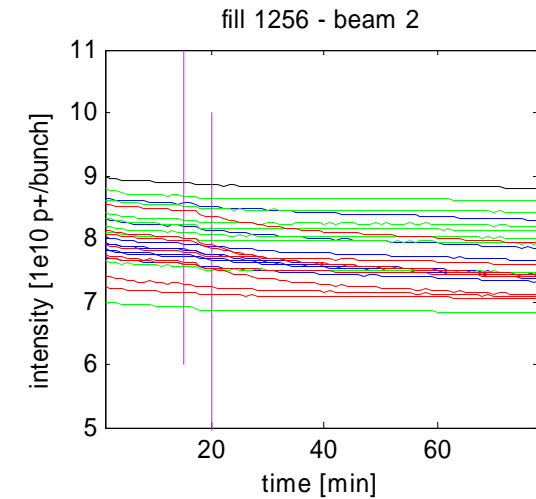
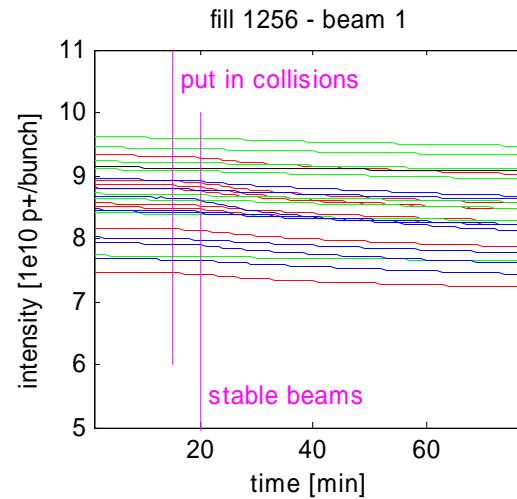
- 14 hours of stable beams
 - last 5 hours missing in Timber
- total losses more similar between b1 and b2
 - different loss rate shape
- outlier: b1 bucket **24851**
- witness 2: losses as green!



IPs: 1 5 2 - 1 5 8 - 2 8

Fill 1256

- 1 hour of stable beams
 - 1 extra hour at flat top due to orbit problems
 - losses and blow up
- same conclusions



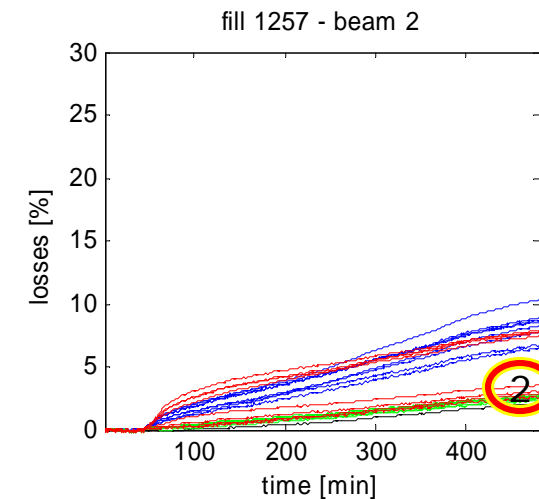
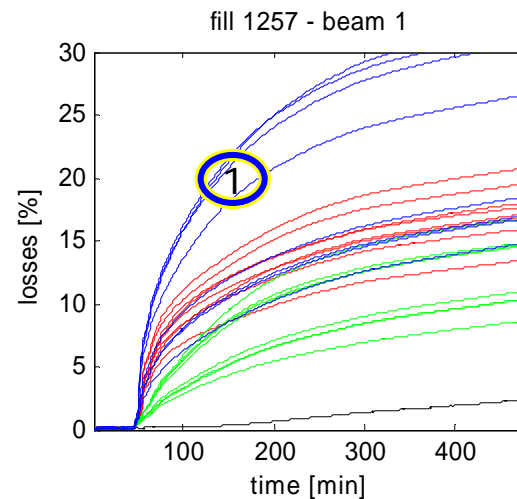
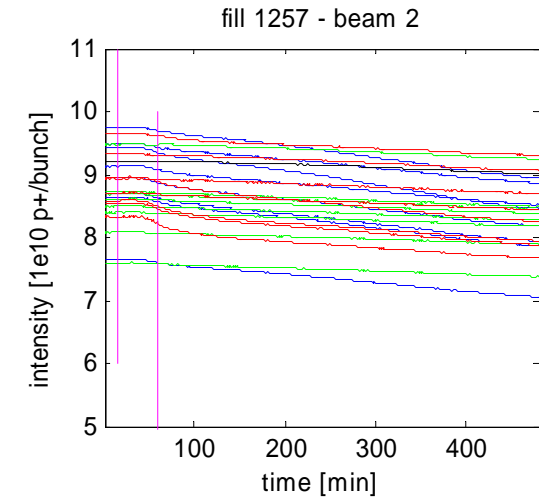
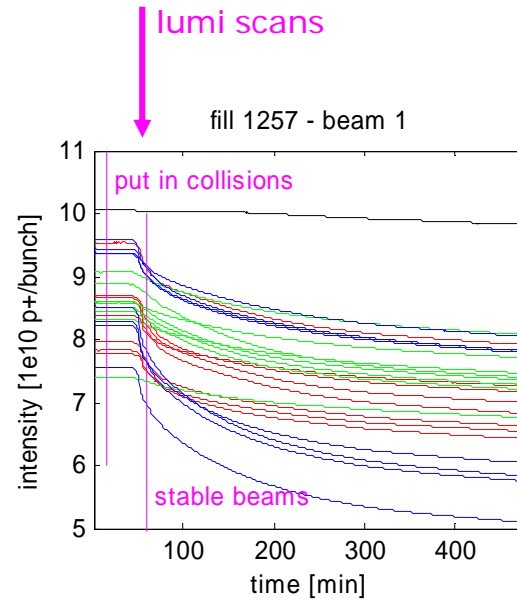
IPs: 1 5 2 - 1 5 8 - 2 8

Fill 1257

- 12 hours of stable beams
 - losses start at lumi scans
 - orbit problem, no collisions before
- very different losses b1/2
 - extraordinary losses for some blue b1
 - buckets 17851-20851
 - bad SPS shot?
 - b2 17851-20851, lowest losses

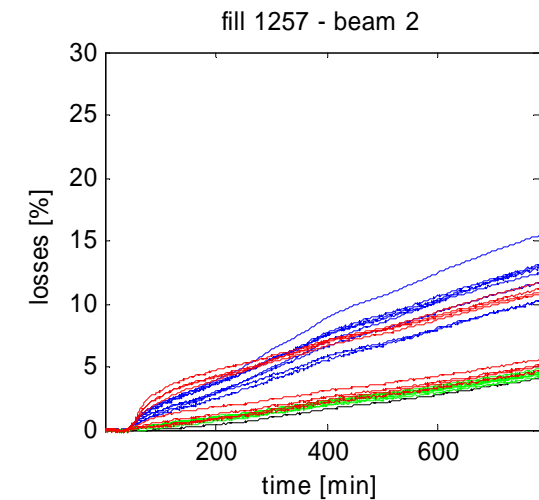
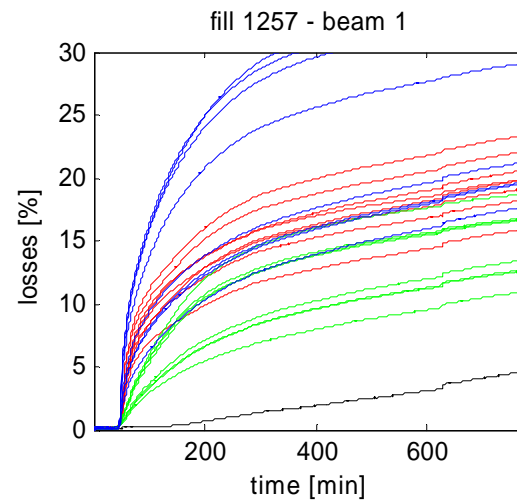
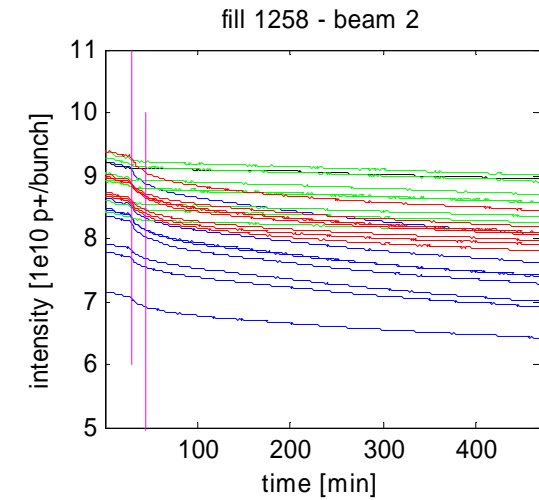
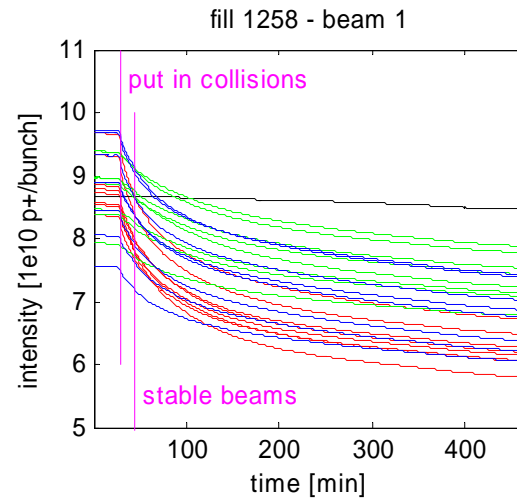
1: buckets 17851, 18851, 19851, 20851
 2: buckets 17851, 18851, 19851, 20851

IPs: 1 5 2 - 1 5 8 - 2 8



Fill 1258

- 7 hours of stable beams
- b1 even worse



IPs: 1 5 2 - 1 5 8 - 2 8

Summary

- bunch-by-bunch differences observed depending on number of collisions
 - clearly related to beam-beam effects
- b1 loses more, probably tune problem
- one unexplained case of witness 2 losses
- Werner's suggestions:
 - swap the tunes for one beam
 - (.31,.32) vs (.32, .31)
 - and includes tune split!