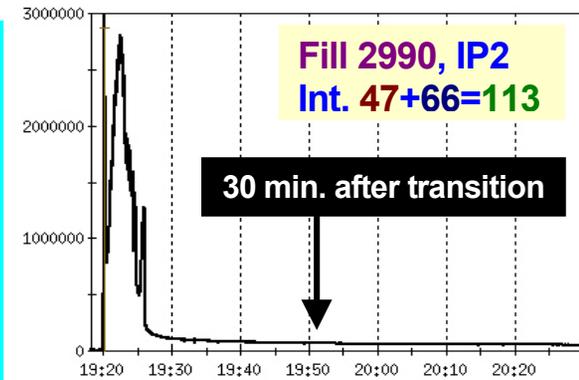
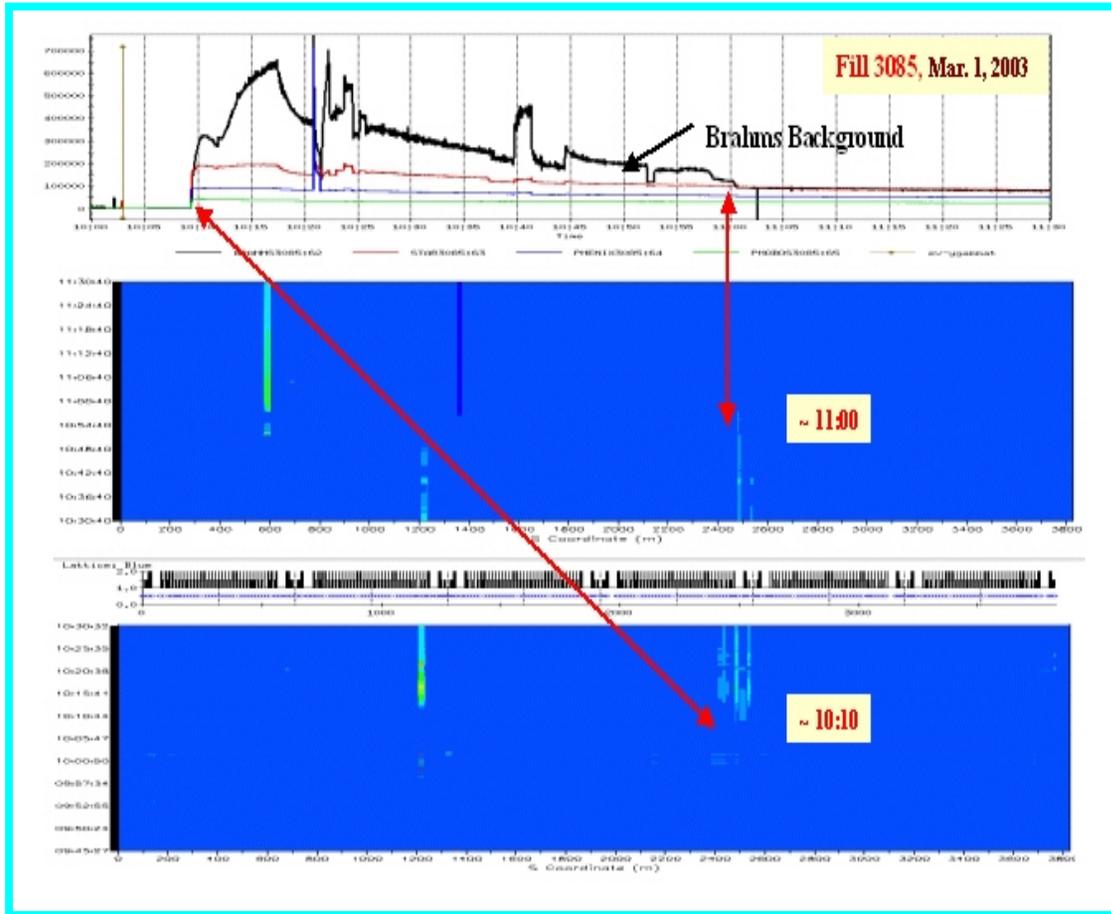


# Brahms Background Issues

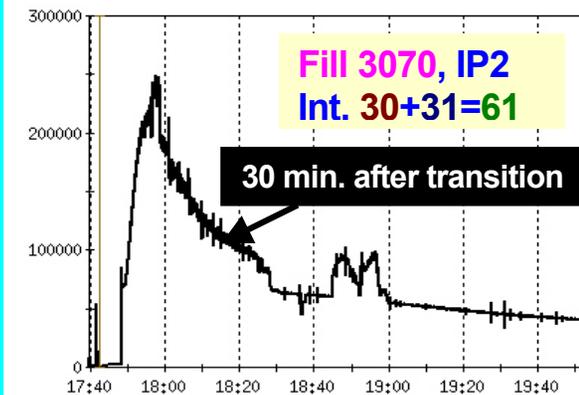
SY Zhang 7-24-03

- d-Au run events relevant to Brahms: **2/9**: dAu3, Phobos betastar from 2 m to 4 m, others 2 m. **2/23**: coherence resolved. **2/26**: 110-bh to 55-bh. **3/5**: dAu4, Brahms' betastar from 2m to 3m.
- From 2/13 to 3/5, Brahms background was affected by **beam loss**. The loss was **not** related with beam intensity, and it happened at early store - with relatively small emittance. The loss started at cogging, so it could be beam-beam effect. If it was the machine tuning problem, then Brahms did **not** have to go to **betastar 3 m**.
- Beam loss scenario is not very clear yet. Larger loss induced singles were at the ZDC **Au-direction**, but it could be deuteron beam loss at the bend, hitting ZDC from **behind** (?). Questions exist. Beam study maybe needed to clarify.
- In addition to the beam loss factor, Brahms background was also affected by high total beam **intensity**. Some evidence indicates to beam intensity induced **pressure rise**.

# I. Brahms - beam loss effect



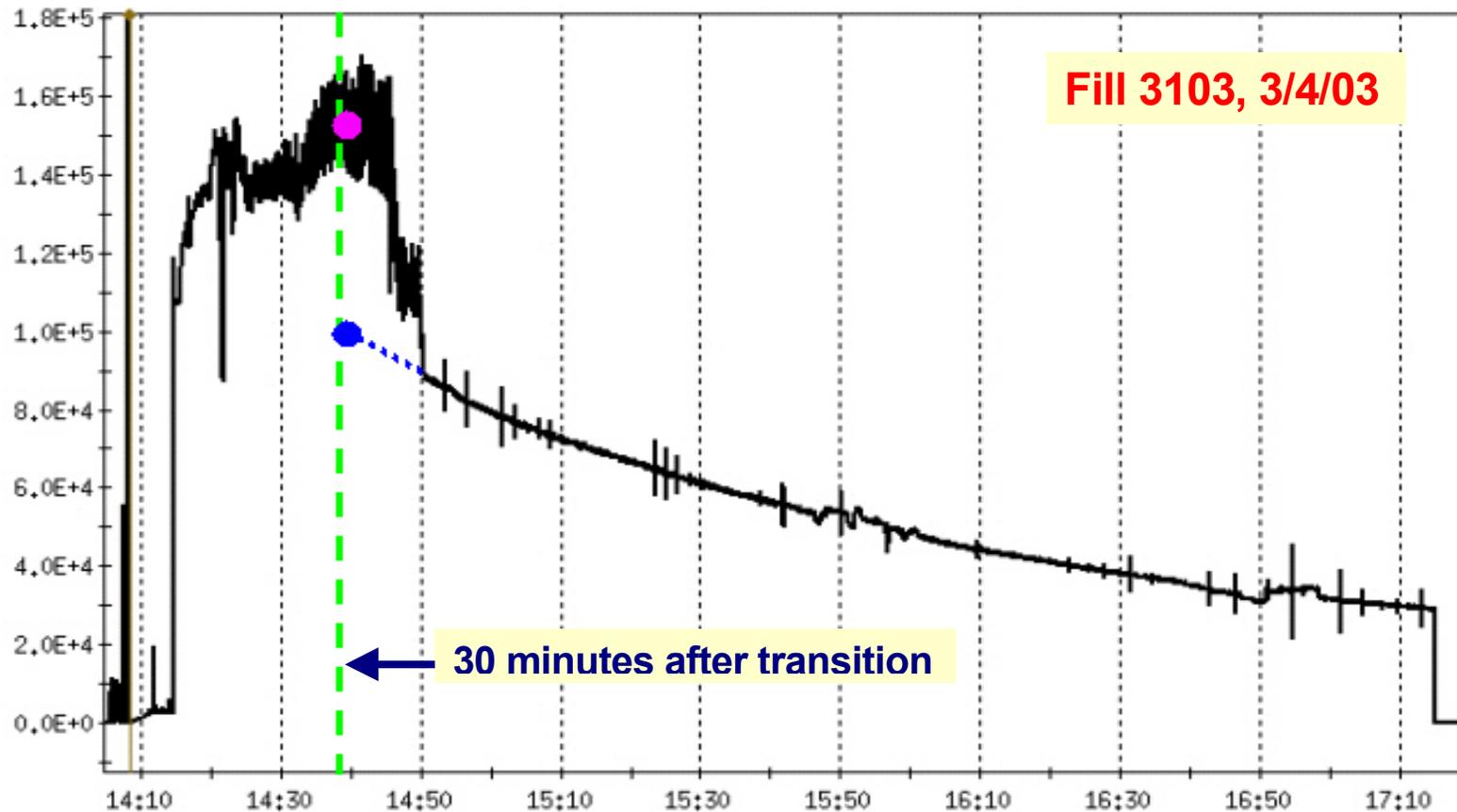
No collimation



With collimation

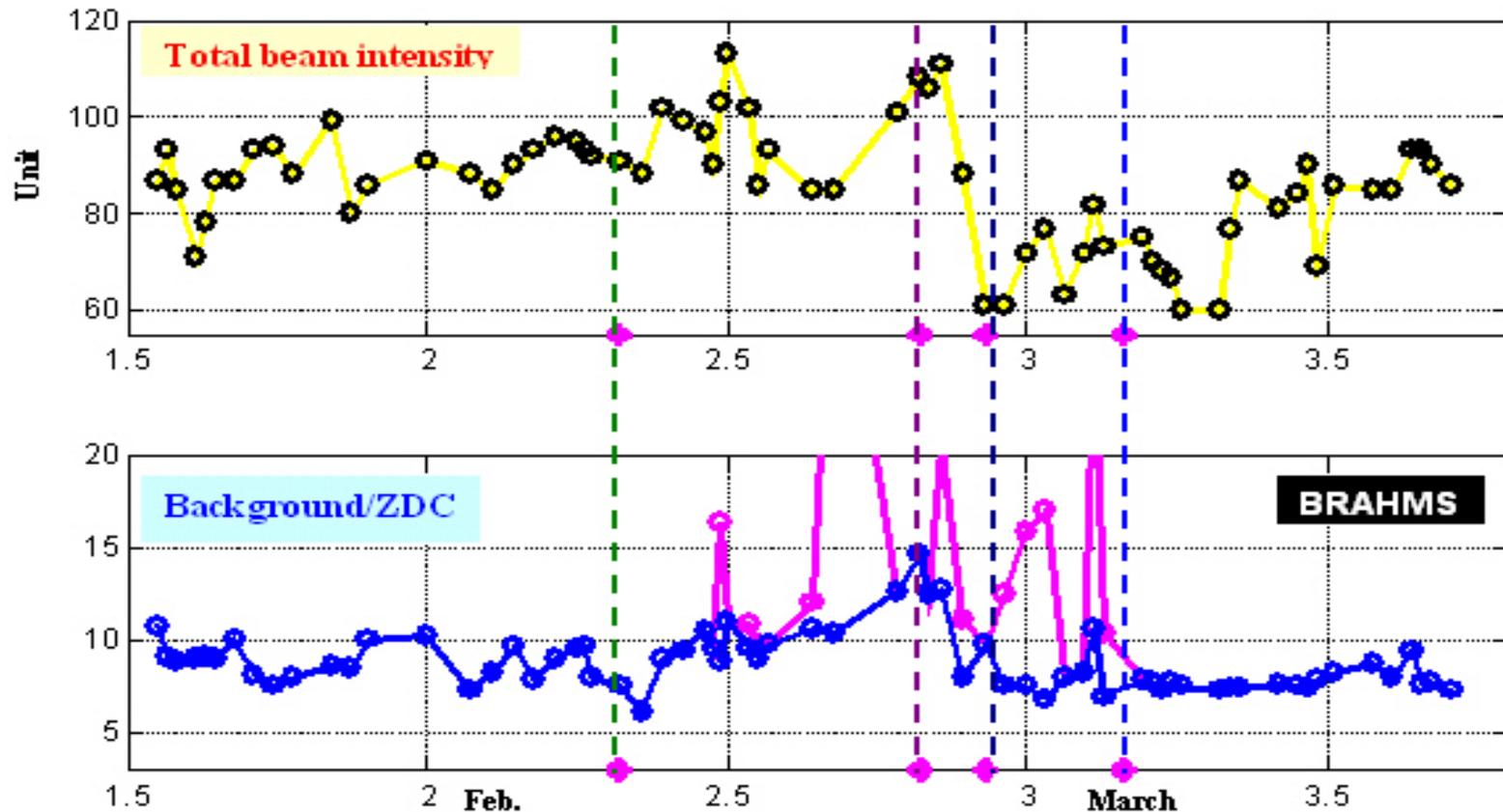
- Beam loss created background. Many similar cases, 2/13 to 3/5/03.
- **Not** related with beam **intensity** - Fill 2990, total intensity 113 unit, no such beam loss induced background at 30 minutes after transition. Fill 3070, intensity 61 unit, such background presented.
- It also happened at the early store, with smaller emittance.

## Brahms - two sets of background data



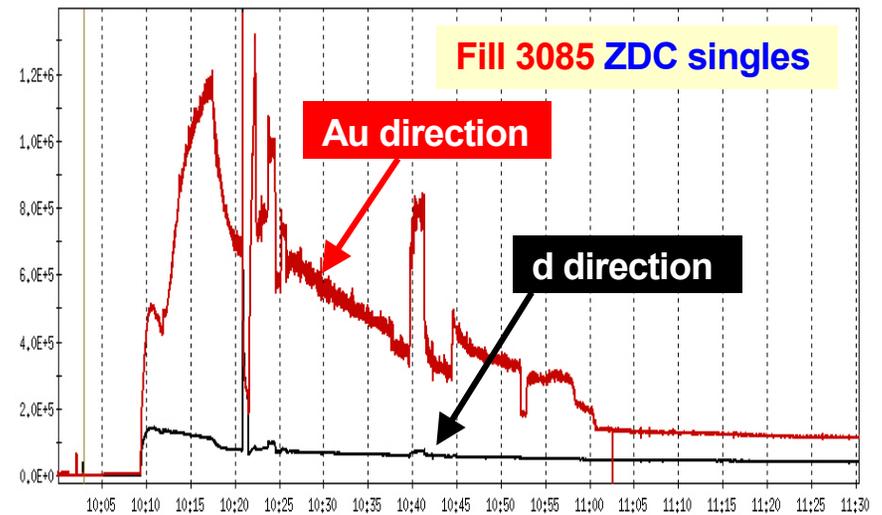
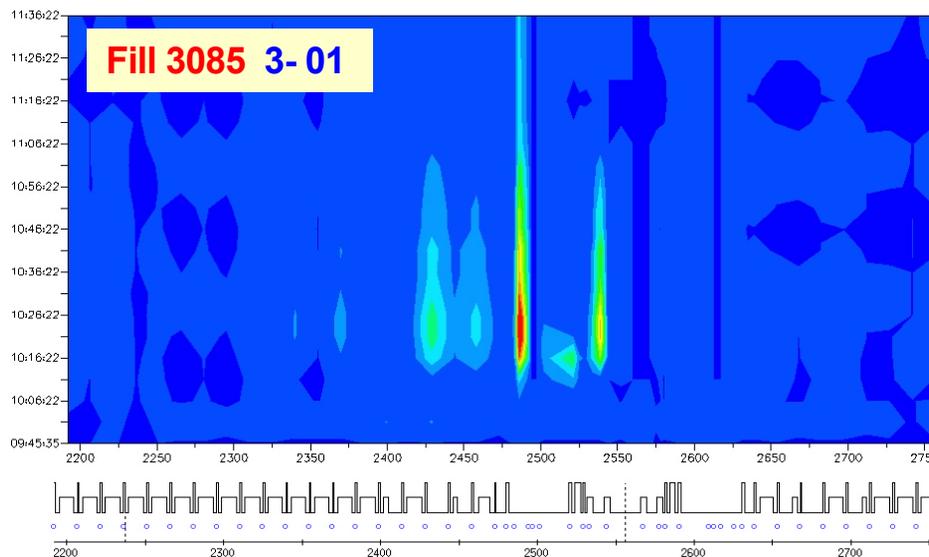
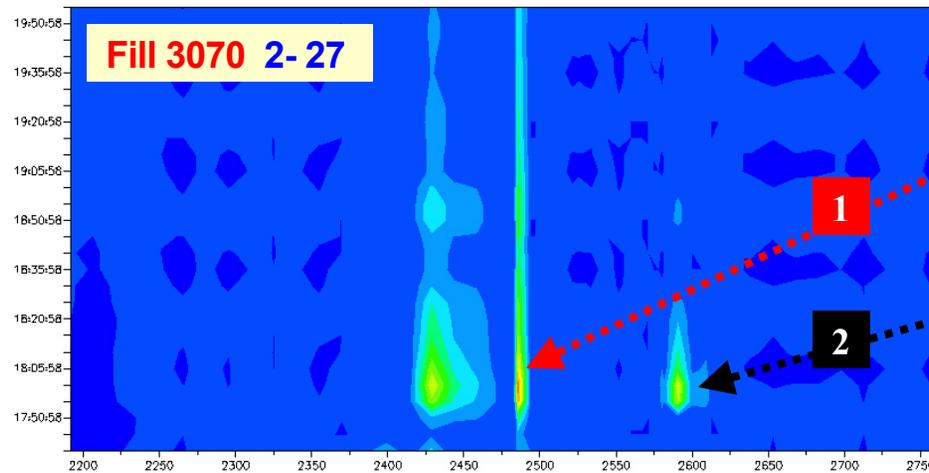
- To exclude the beam loss factor, two sets of background data were produced, Blue and magenta, shown as above.
- This type of beam loss disappeared, completely, after 3/5/03.

## Brahms - total intensity and background / ZDC ratio



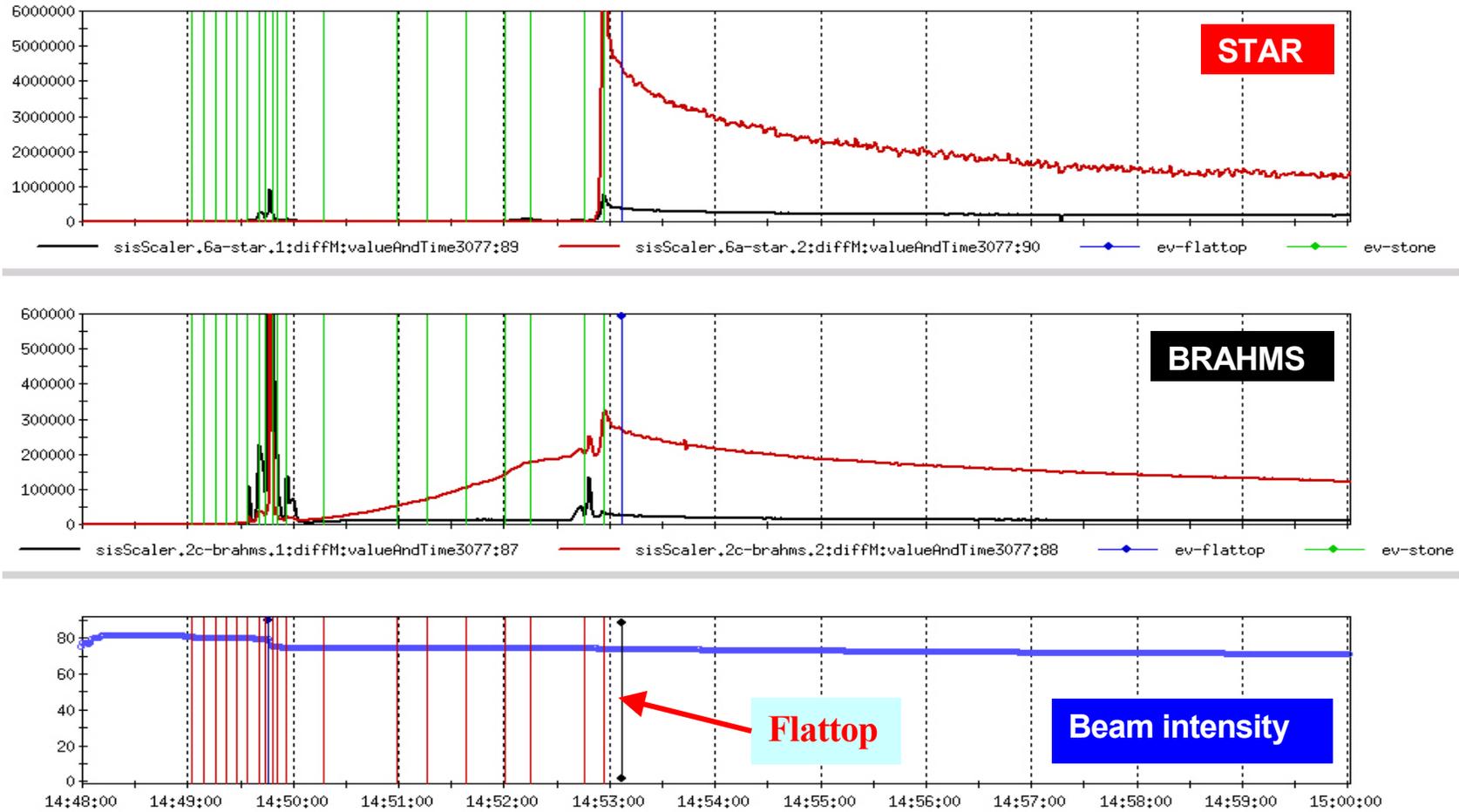
- **Background / ZDC ratio was improved at 3/5/03, dAu4, betastar from 2m to 3m.**
- **Magenta line:** beam loss affected background / ZDC. Improved at 3/5.
- **Blue line:** excluded beam loss effect. Improved at 2/26.

## II. Beam loss pattern



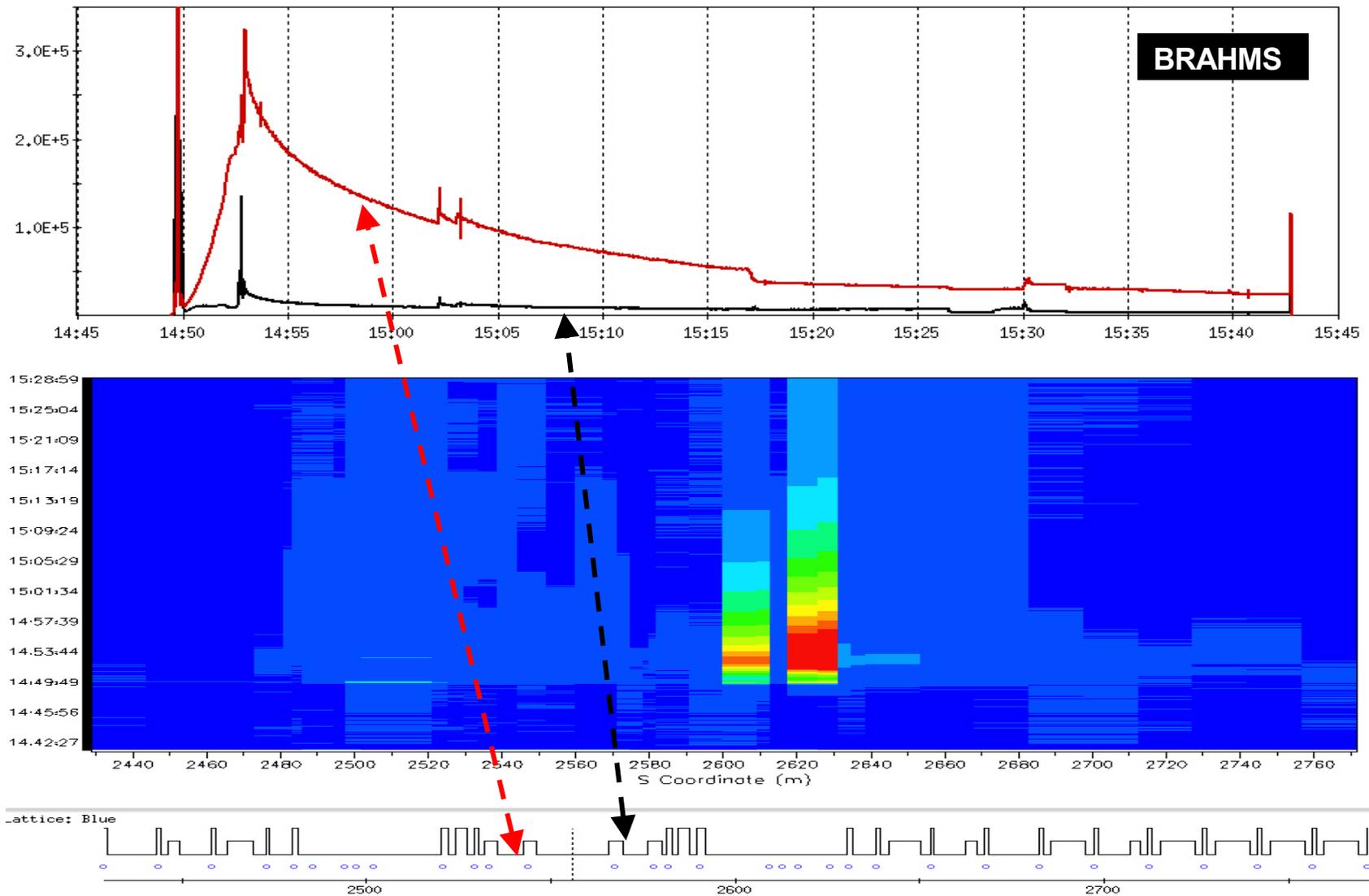
- **Red:** ZDC single, **Au-direction**, **Black:** ZDC single, **d-direction**, (Angelika).
- **1** : Loss at Q4? ZDC Au-direction, but could be d beam, from behind (?)
- **2** : Loss at triplet? ZDC d-direction, from which beam?
- Beam study?

# Deuteron beam ramp (no Au), Fill 3077



- Large ZDC single at **Au-direction**, but there was **no Au beam**.
- Explained as d beam loss at the bend, from **behind ZDC-Au**.
- With limited ZDC acceptance and tricky loss angles, can we explain such large singles,  $\gg 6$  MHz at Star?

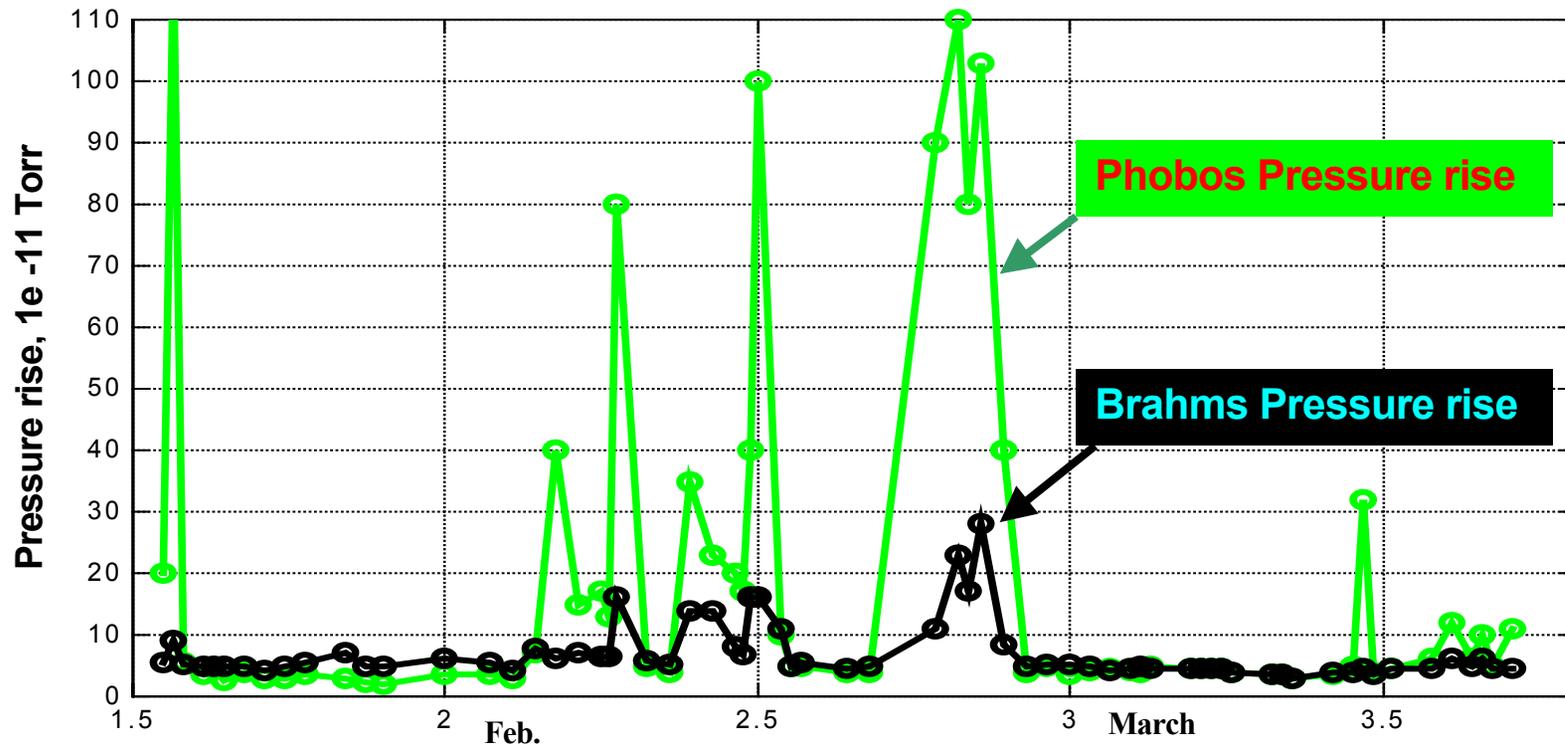
# Beam loss and ZDC singles, deuteron ramp, Fill 3077



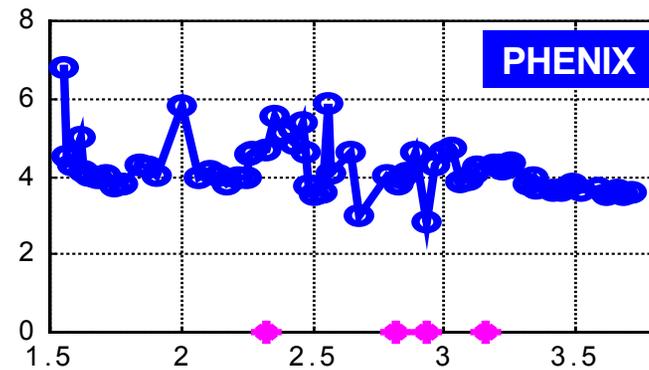
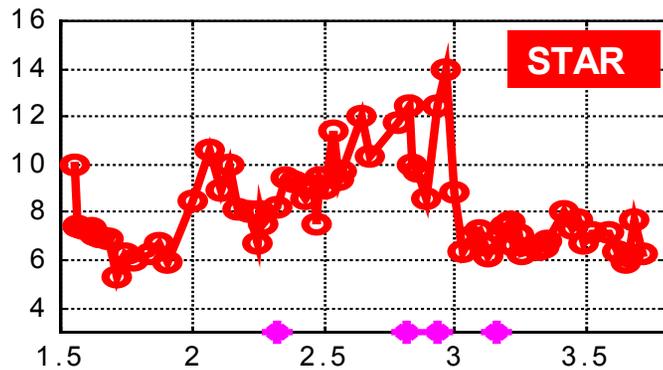
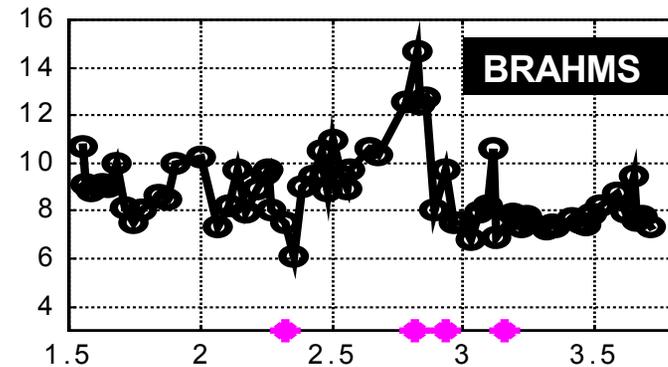
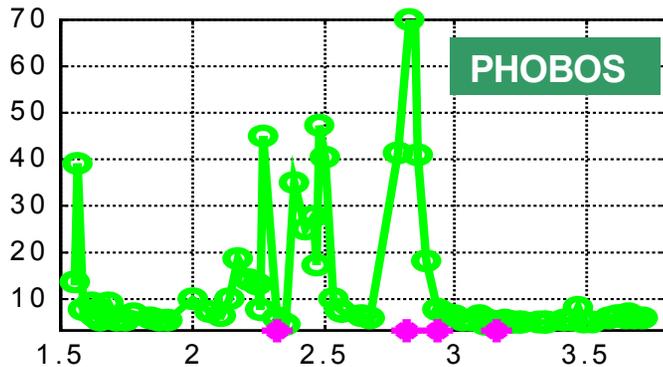
- How to explain the loss and ZDC singles?
- Is it possible **Red** is d-direction?

### III. Beam-gas factor?

#### Pressure rise at Brahms, - vs. Phobos

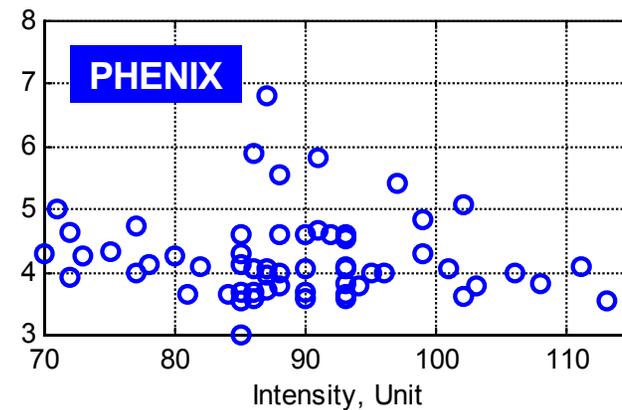
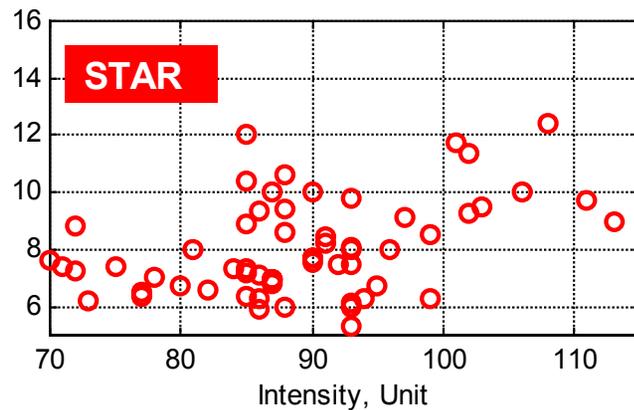
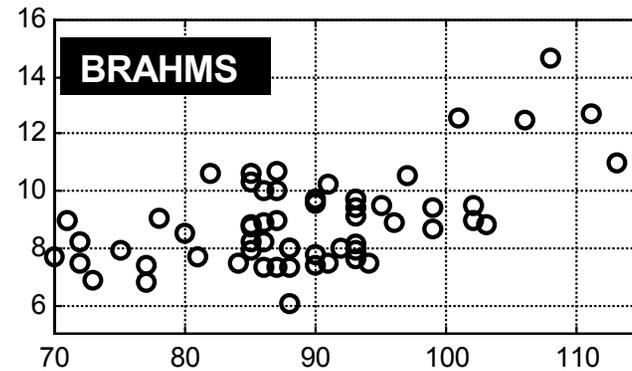
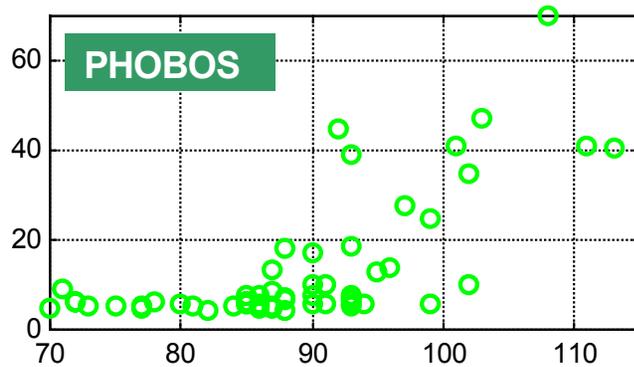


## Background / ZDC history



- Phobos had **clear** beam intensity caused pressure rise problem.
- Excluding the beam loss factor, Brahms may have same problem, but in **much less** extent.
- Star looks improvable, **pressure rise?** (Dick Majka)
- Phenix had no such effect.

## Background / ZDC vs. beam intensity



- Background / ZDC shows beam intensity effect for Phobos.
- Similar effect for Brahms and Star? Much less than Phobos, but not negligible.
- Phenix had no such effect.