

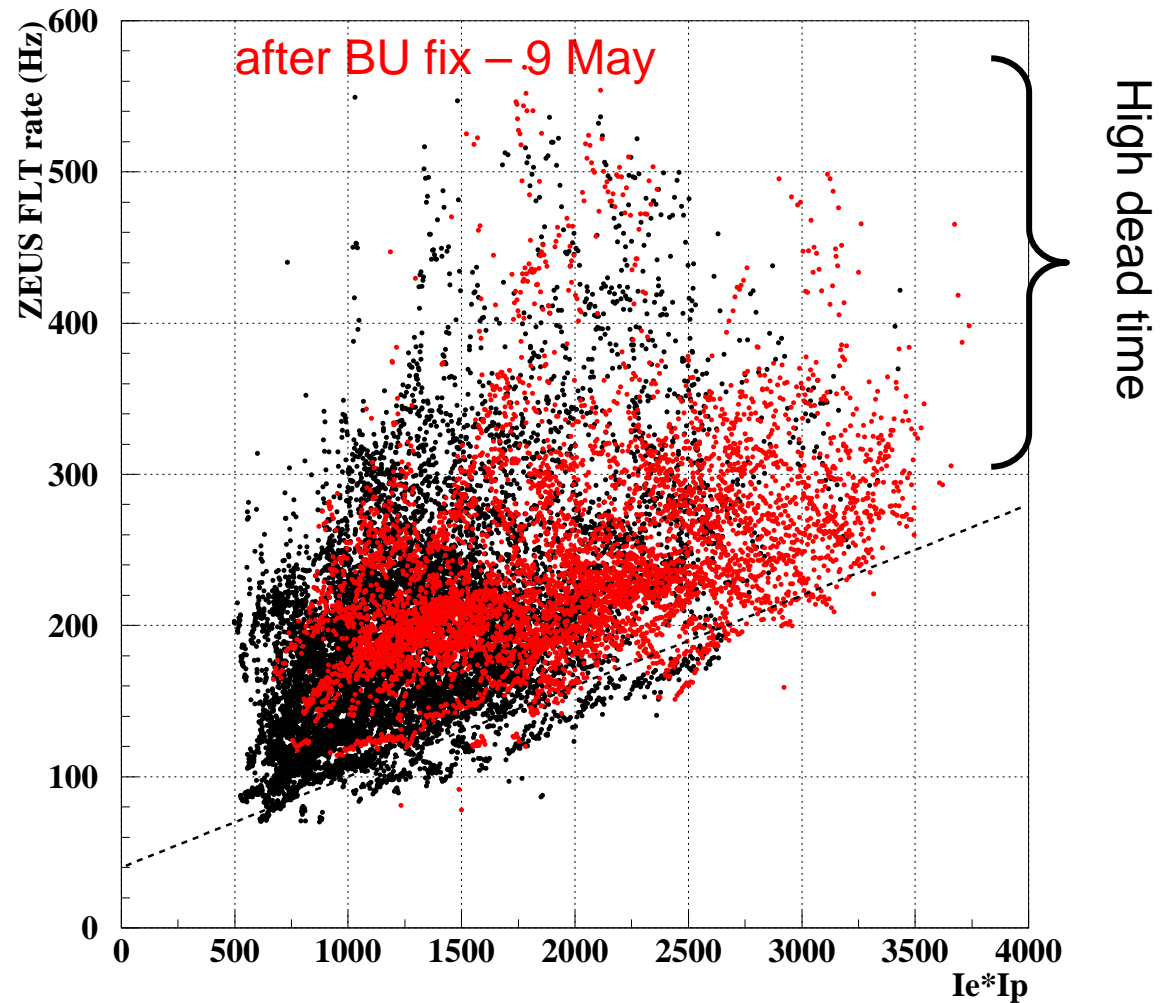
Investigation on ZEUS FLT high rates

- After the BU fix:
 - Less trip (good !) but
 - We see high dead time more often caused by the FLT high rates (now that we can run with less CTD trips)
 - We know that the feature is high CC rate + muon rate
 - Does it depend on something ?

Status $I_e * I_p$ vs FLT rate

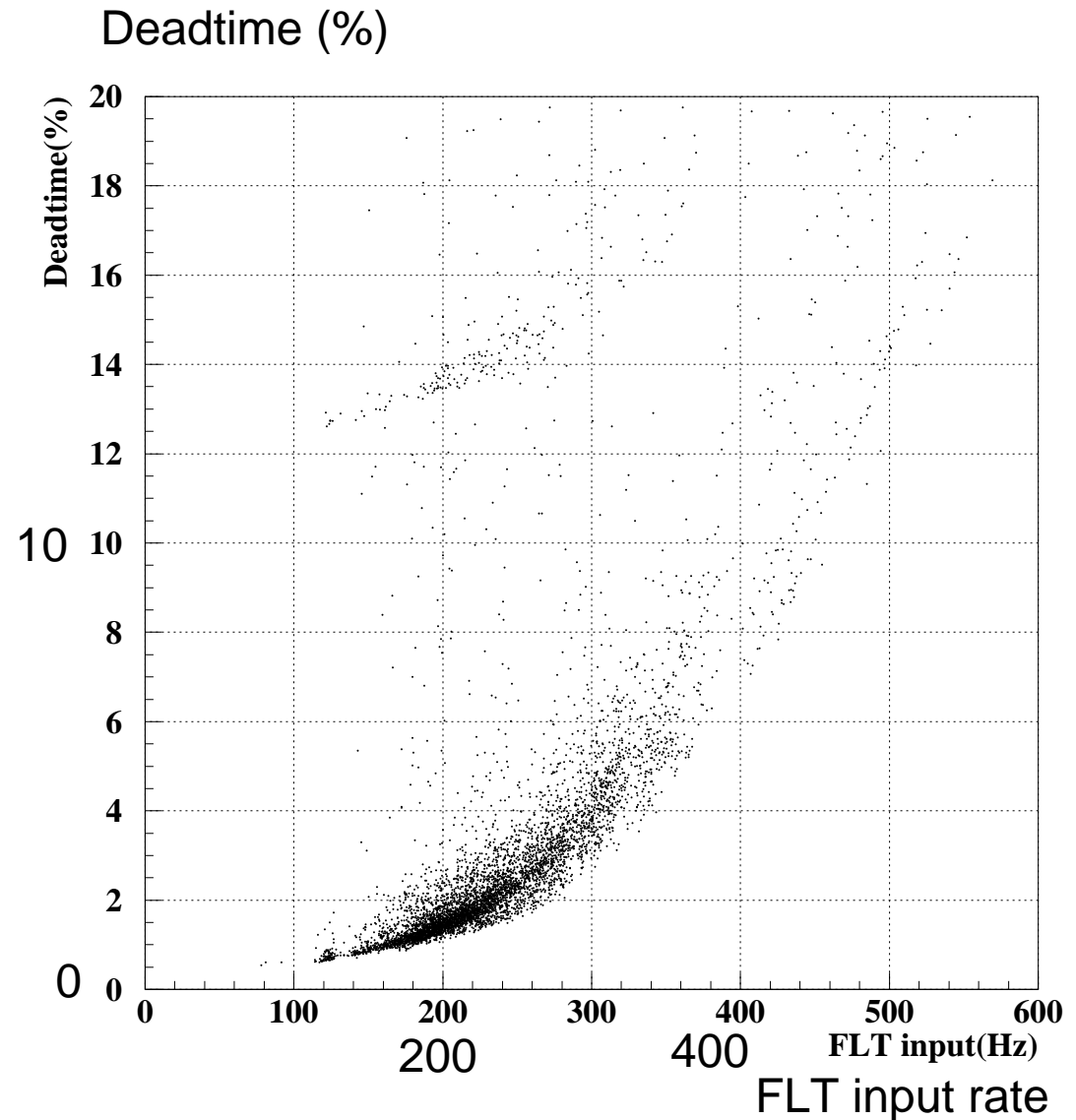
16 Feb(NC FC veto) – before BU fix

- The rate at the beginning is good after the BU fix
- The rate at low current became better only for recent fills.



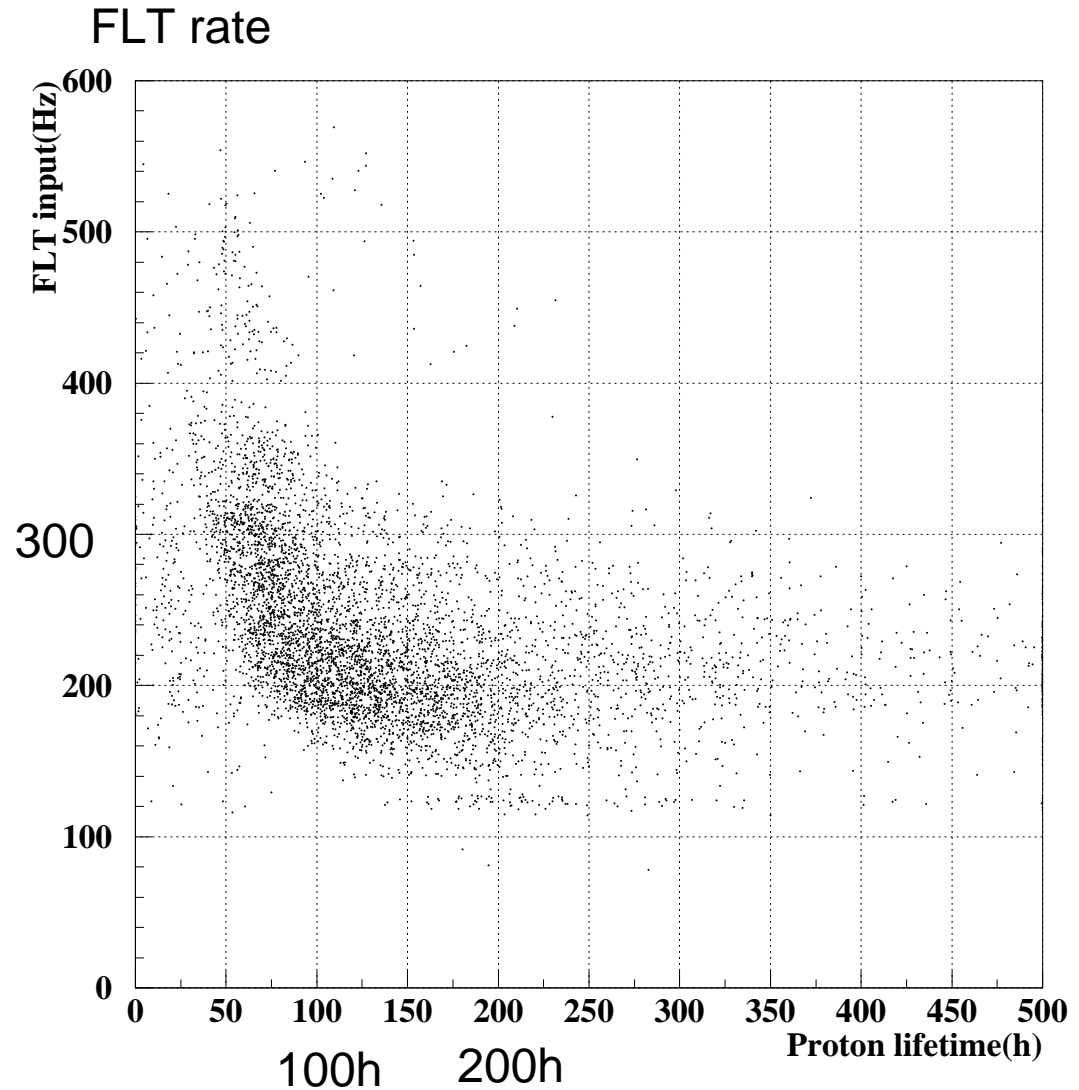
FLT input rate vs. dead time

- Good correlation: our DAQ runs stable
- 3-5 % DT at 300 Hz
- 7-10 % at 400 Hz



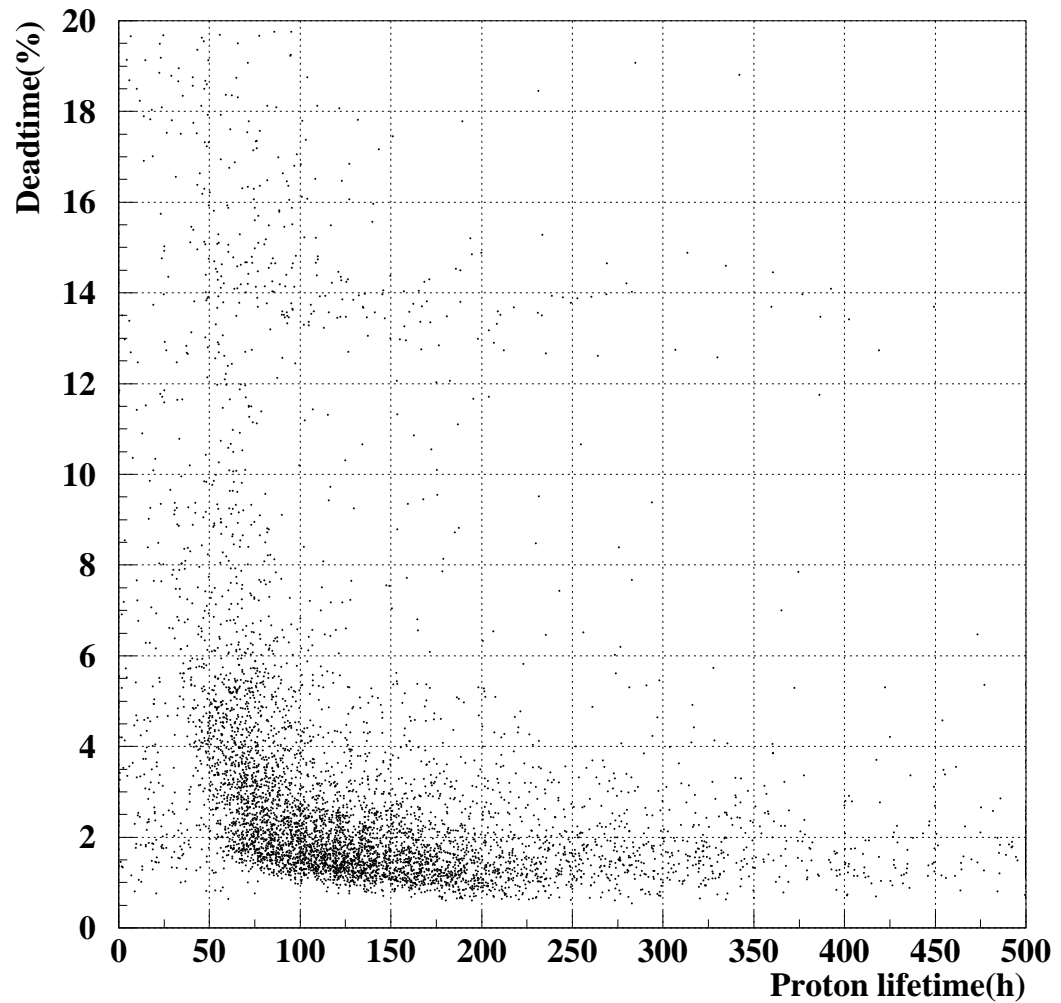
FLT rate vs. proton lifetime

- Trigger rate has a strong (anti-) correlation with the proton lifetime
- Above 100 hours: rates are stable
- Below 100 hours: rate often blows up
 - gives problem if the beam current is high
 - does not allow us to switch to high-acceptance trigger



Dead time vs. p lifetime

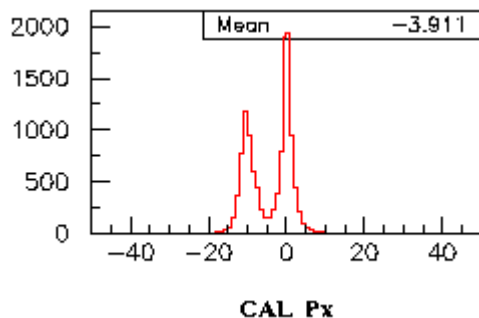
- No problem on dead time for $> 100\text{h}$ of lifetime
- If the lifetime is below 100h , we often get high dead time



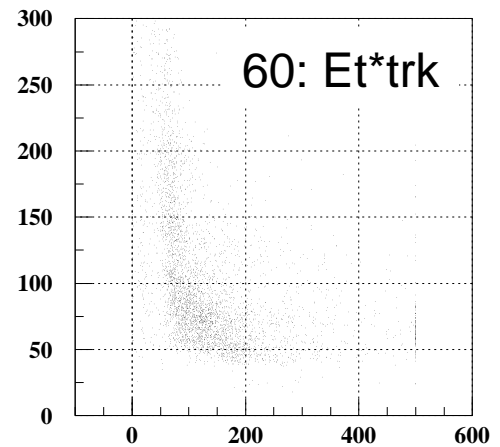
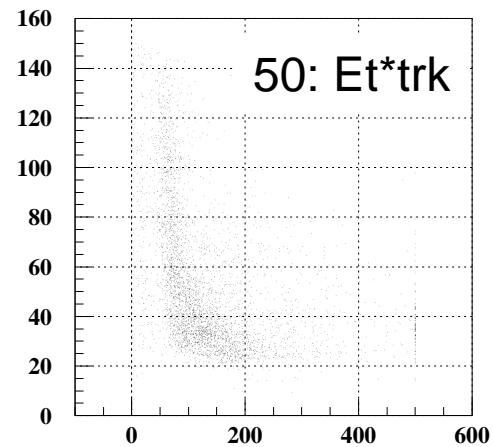
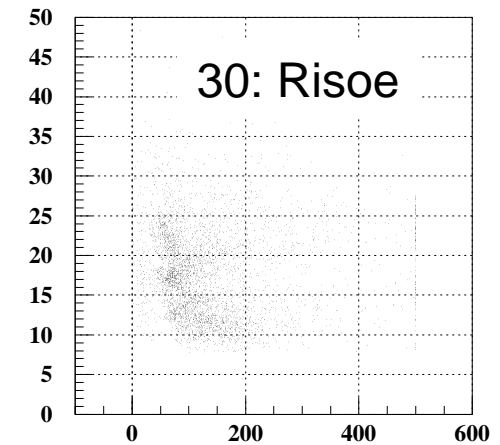
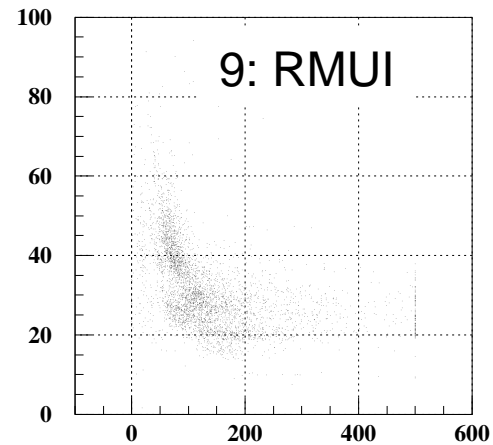
Which type of triggers ?

- Electron is insensitive
- Example with strong sensitivity:
 - slot 9 rear muon (halo muon)
 - slot 50 Et*track (Beamgas)
 - slot 60/63 CC trigger Famous negative Px events

FLT output



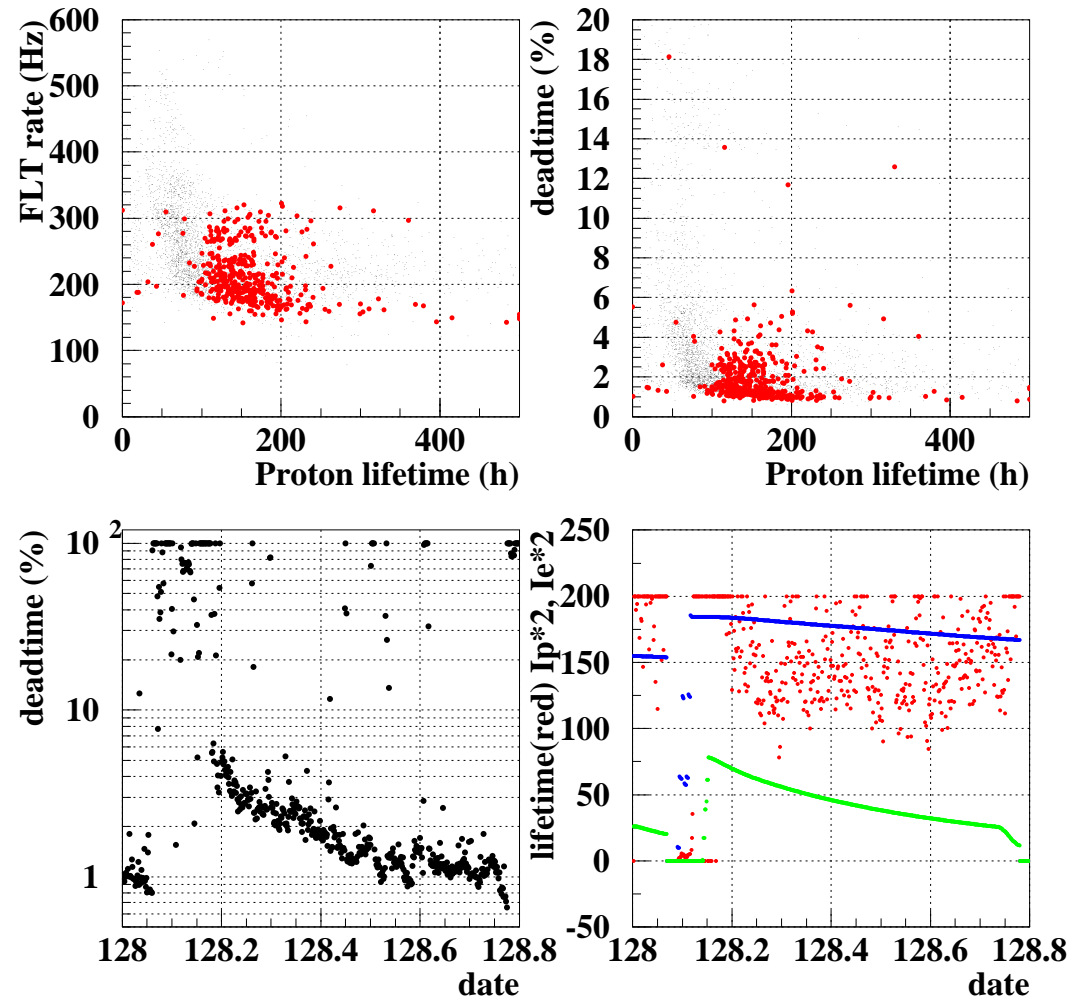
- All suggesting beam scraping somewhere in ZEUS upstream



Example of a good fill: 8 May

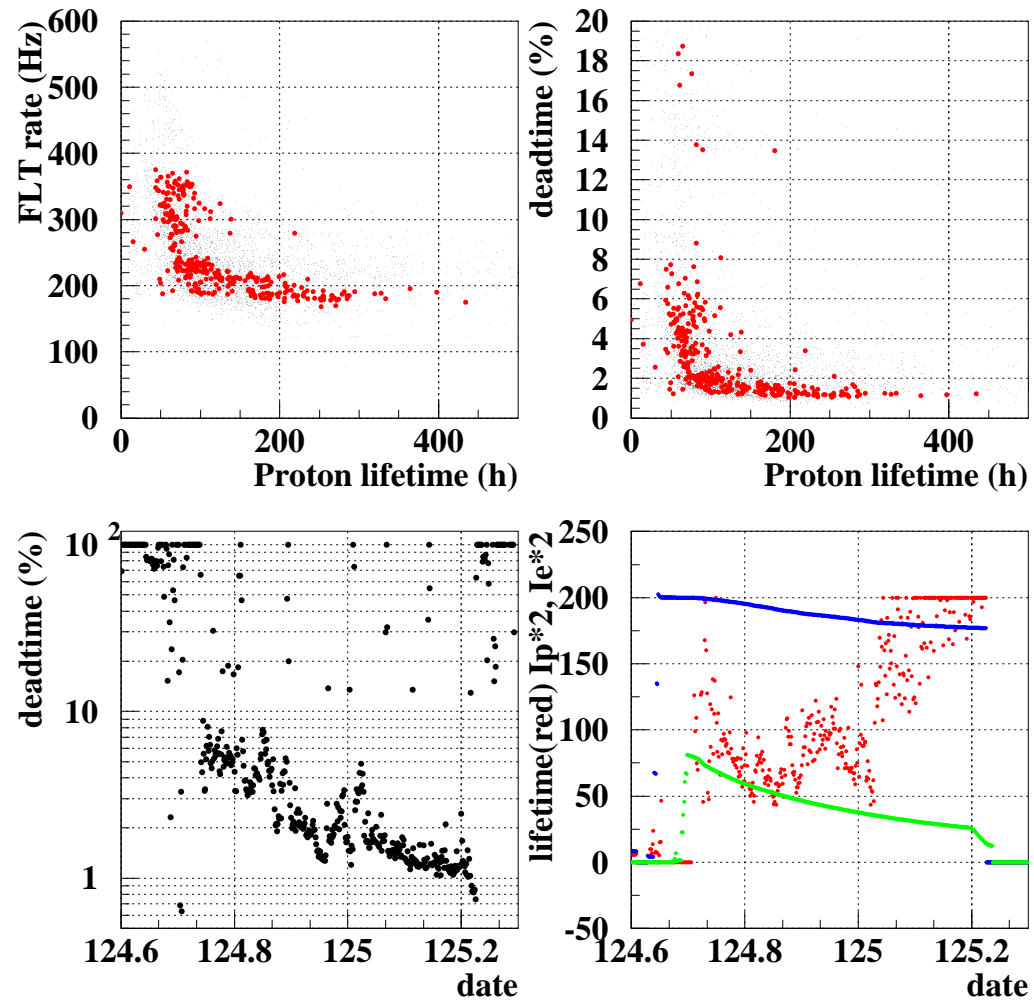
- Often a fill gives > 100 h lifetime !
- ZEUS DT is $\sim 5\%$ at the beginning
- Then mostly 1-3%, constantly decreasing with beam currents.

NB: deadtime 100 %:
either chamber trip or
ZEUS not active.



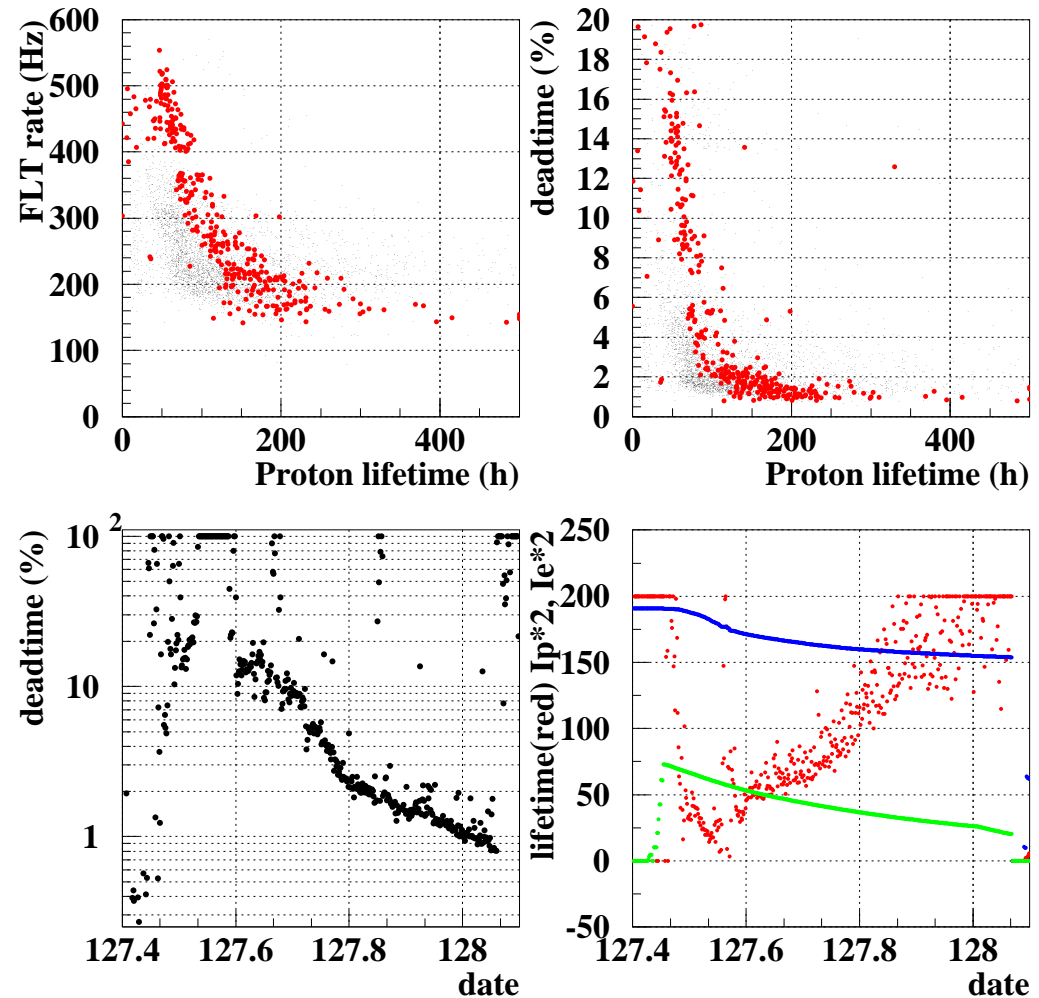
Example of ~ bad fill: 3 May morning

- Lifetime short at the beginning, then improved
- Trigger rate stayed high for 3 hours with 4-5 %
- Later smooth data taking with longer life time
- Clear correlation in beam lifetime and the FLT rate



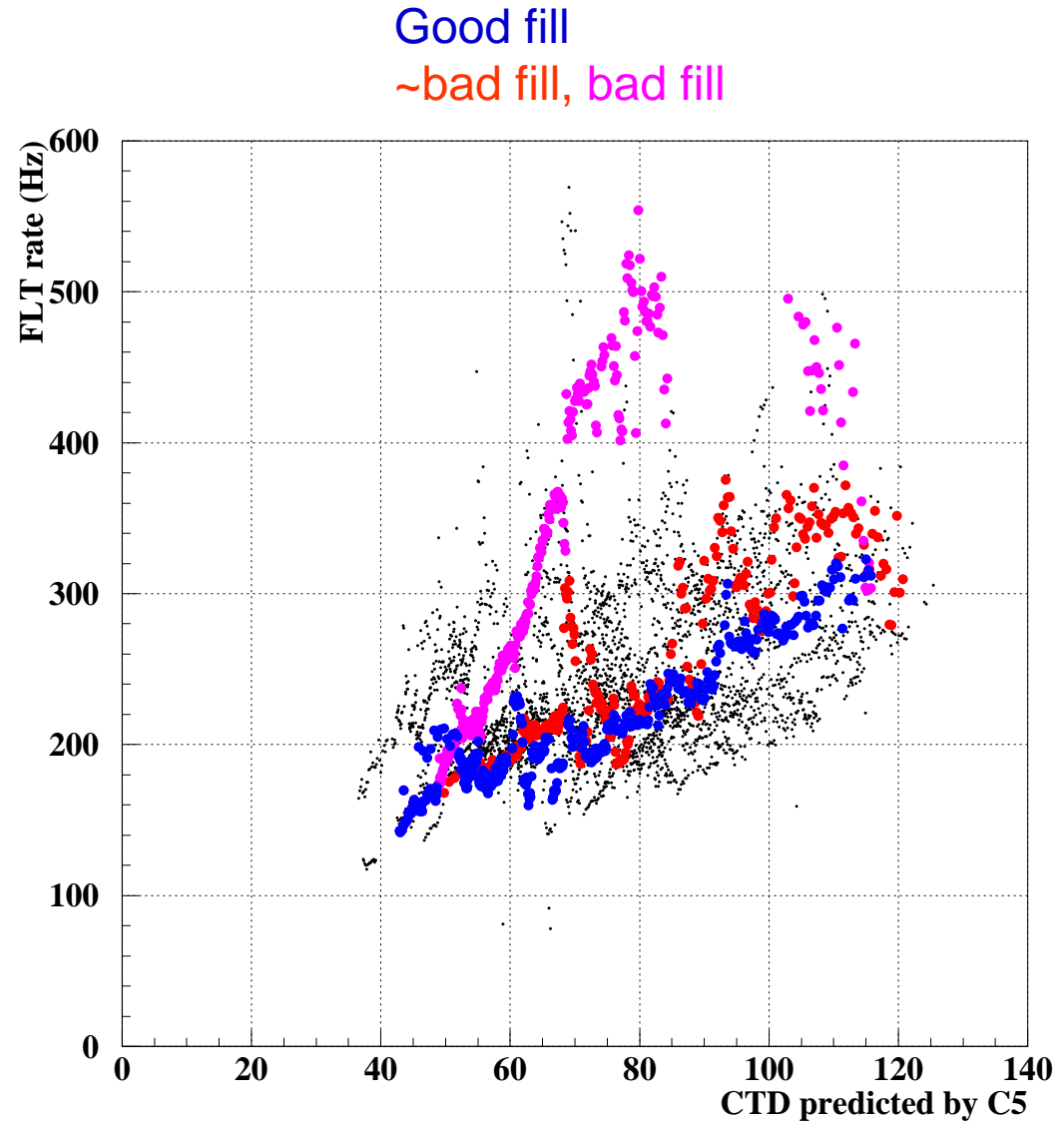
Example of a bad fill: 7 May

- Started with very short (< 50 h) life time
- First beam scraping, then the lifetime got better
- Rest of the data taking was smooth
- Clear correlation of the beam quality and our trigger rate



Correlation with our BG monitor

- Can't we predict the trigger rate using our CTD current prediction ?
- The correlation is there, but different fill-to-fill
- HERA cannot always use the C5 CTD prediction to tune the beam for the trigger



Conclusion

- Beam life time has a strong correlation to the trigger rate, originated from events far upstream.
- ZEUS suffer from high background for many of the runs with proton lifetime < 100 hours:
An indication of beam loss upstream of ZEUS
- But no problem if > 100 hours (half of fills)
- We would like to ask HERA to understand this

