

Výpočet korekce k určení přesné polohy dopředného detektoru v experimentu ATLAS

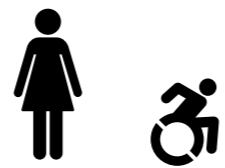
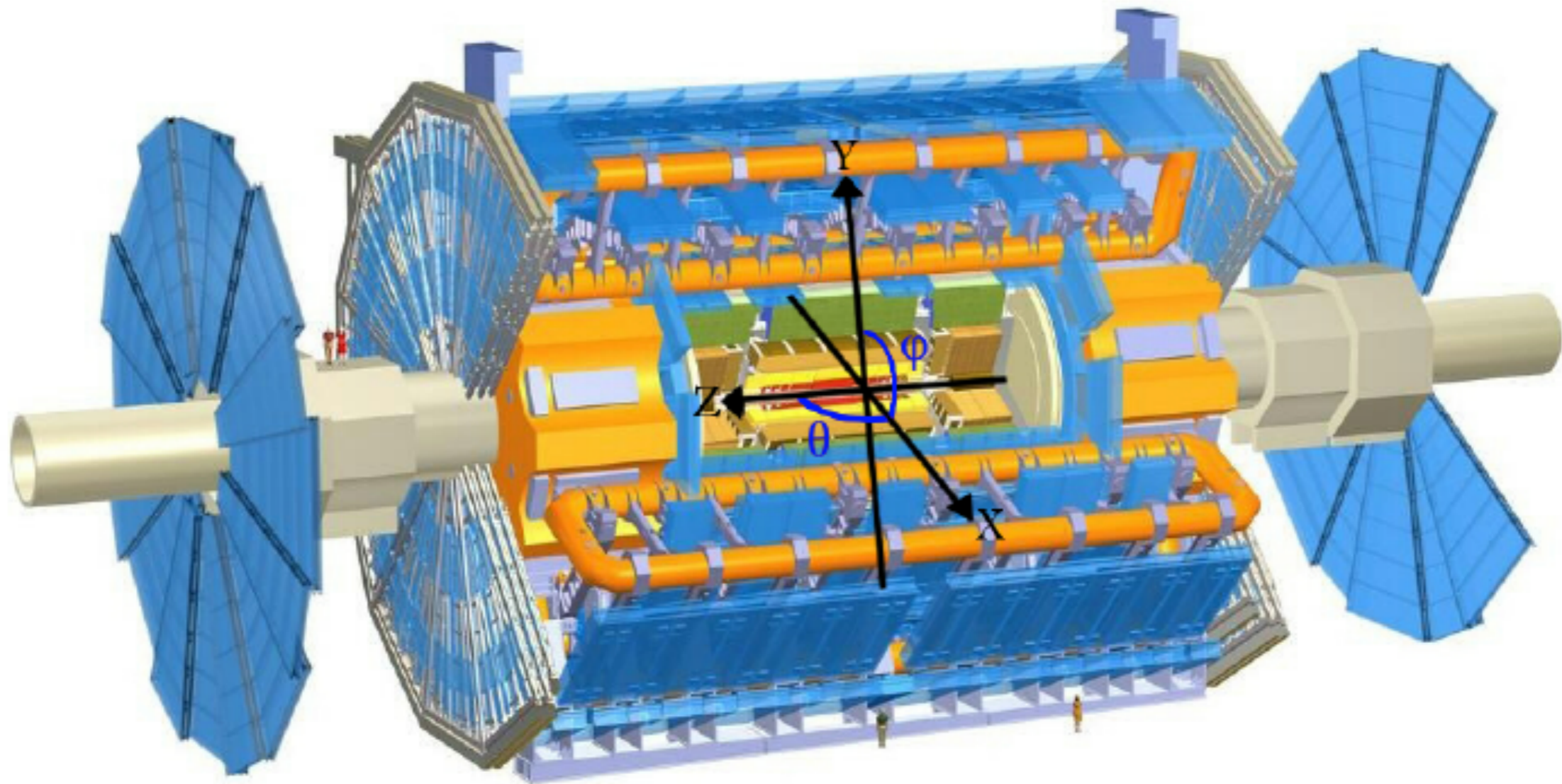
Školitel:
Ing. Miroslav Myška, Ph.D.

David Gančarčík
WEJCF2020
16/1/2020

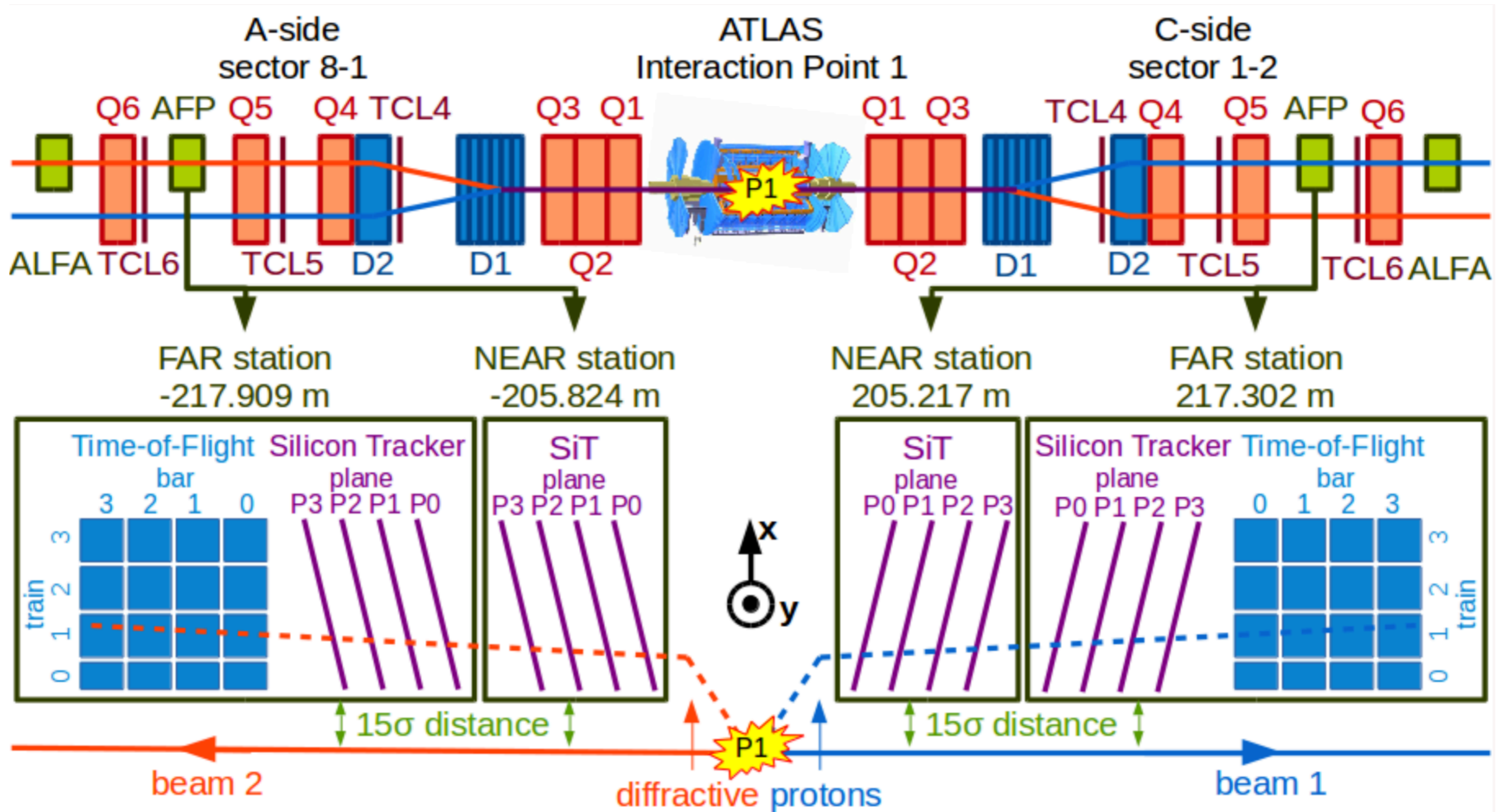
Obsah

- AFP
- Fyzikální motivace
- Jakým způsobem měří?
- Proč potřebujeme znát jeho přesnou polohu?
- Hot-spot metoda
- Předběžné výsledky

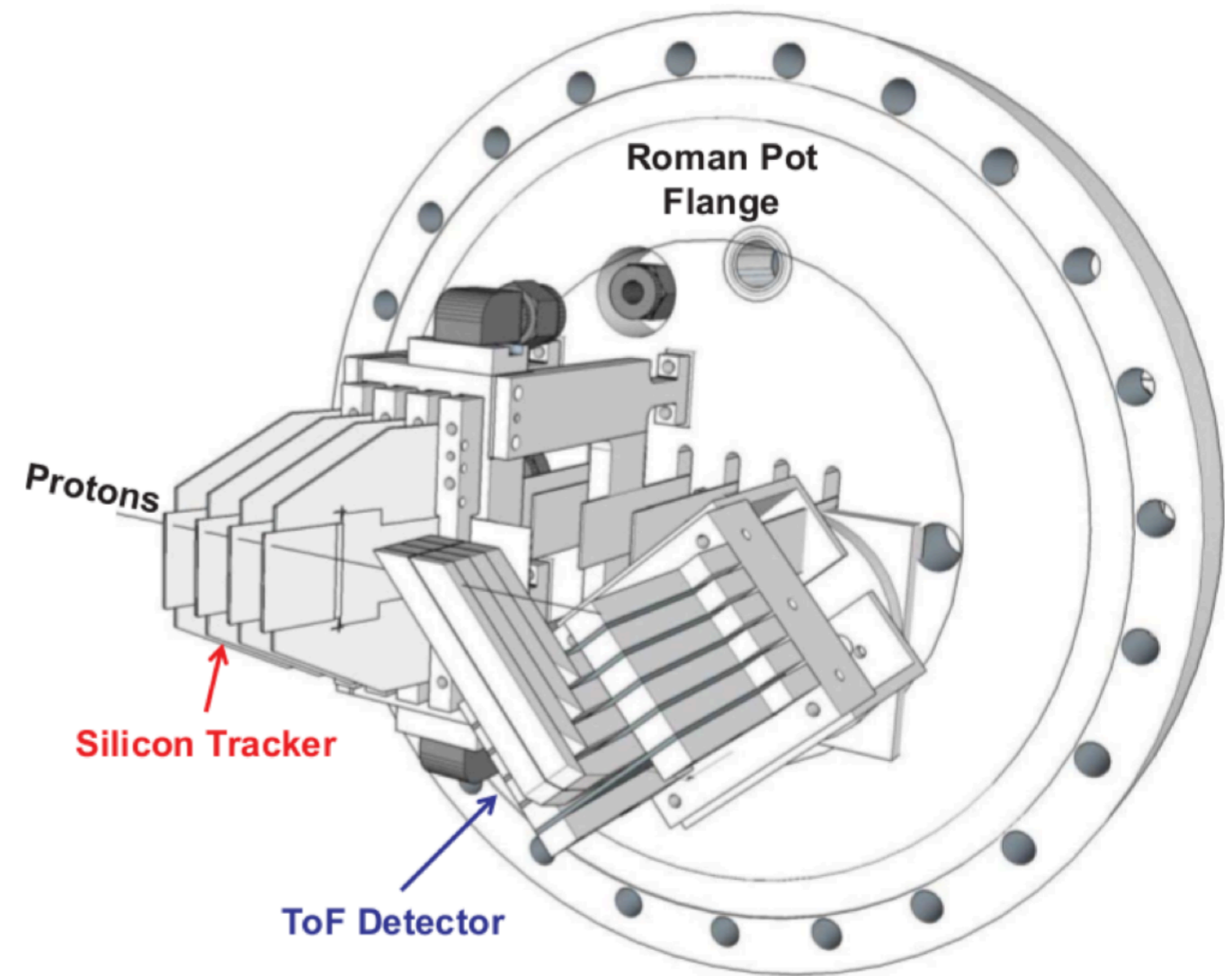
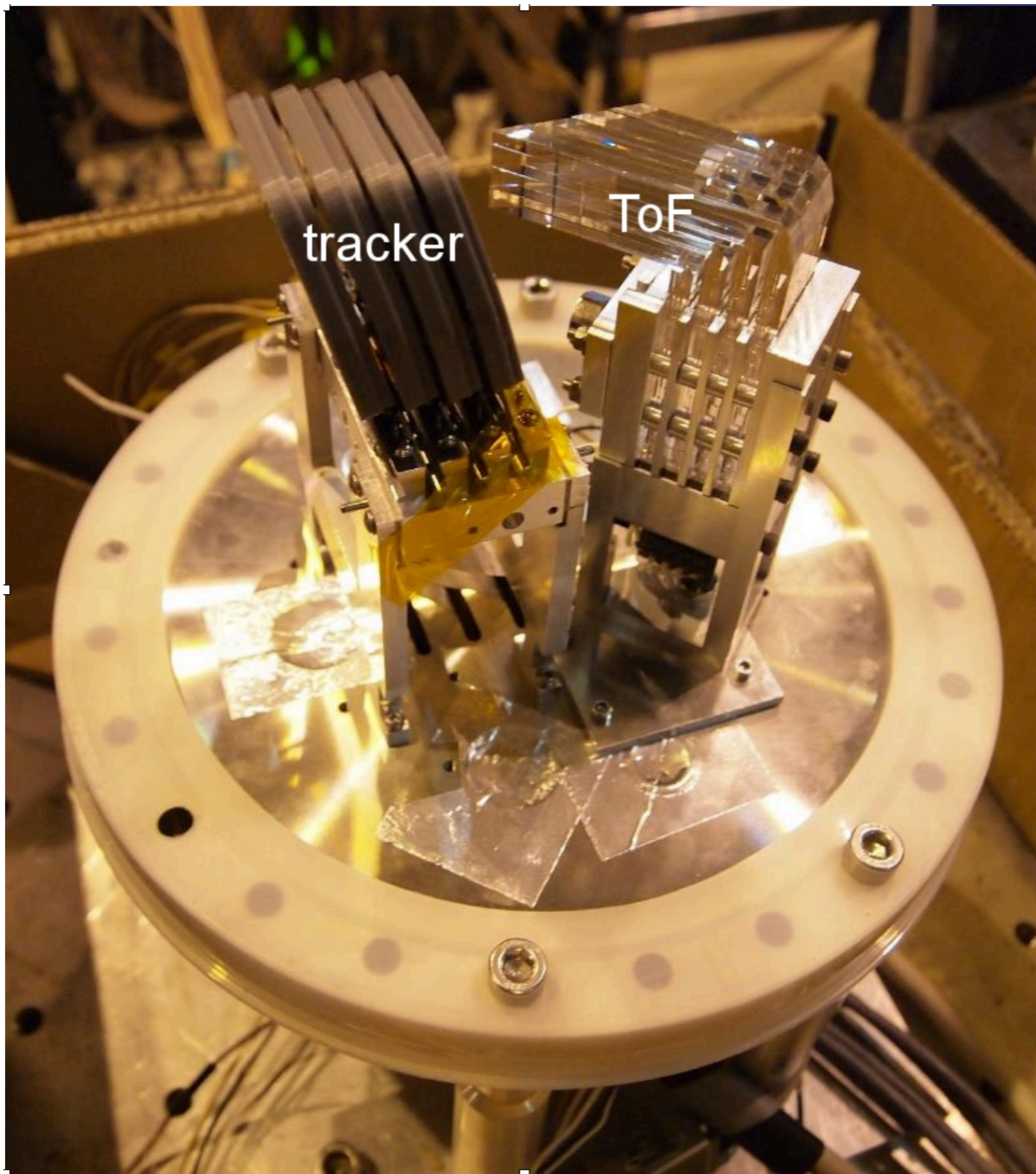
Detektor ATLAS



Detektor AFP



Detektor AFP

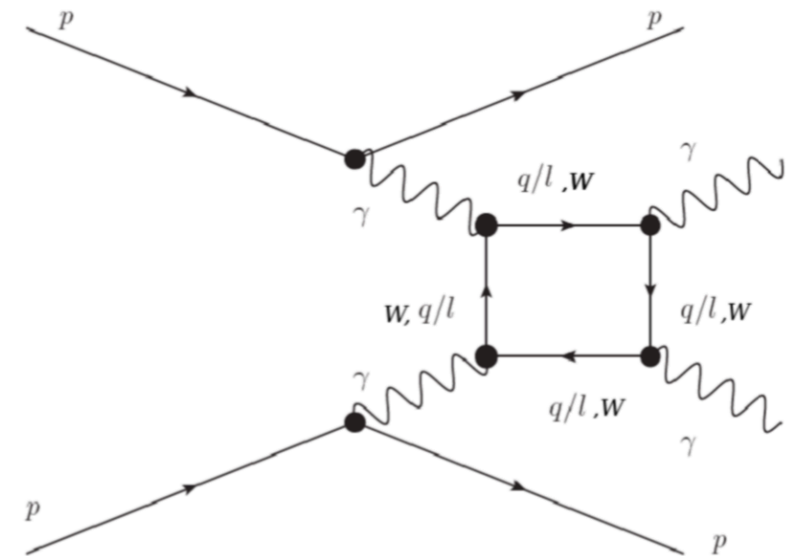
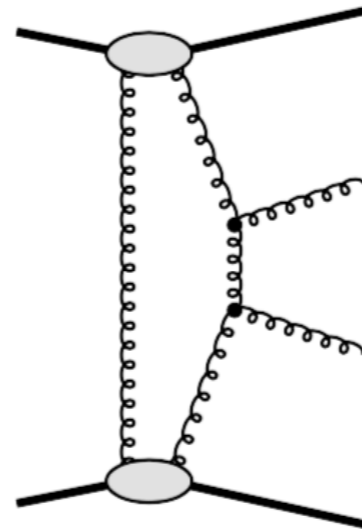
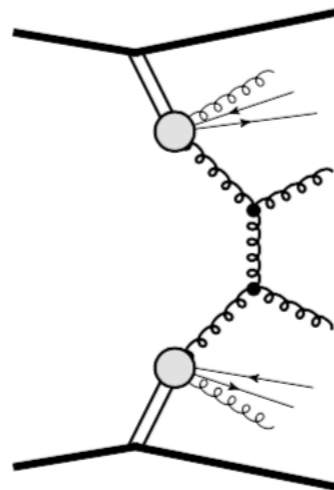


336x80 pixelů $50 \times 250 \mu\text{m}^2$

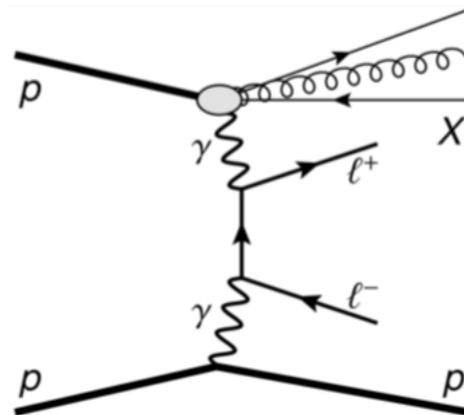
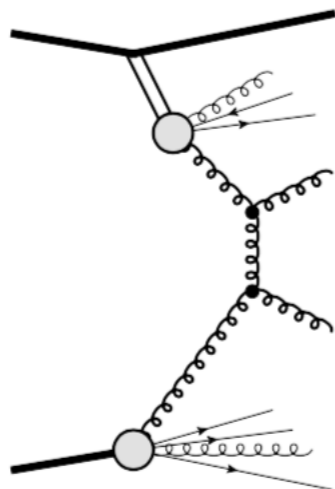
Fyzikální motivace

Difrakce

Exkluzivní produkce:



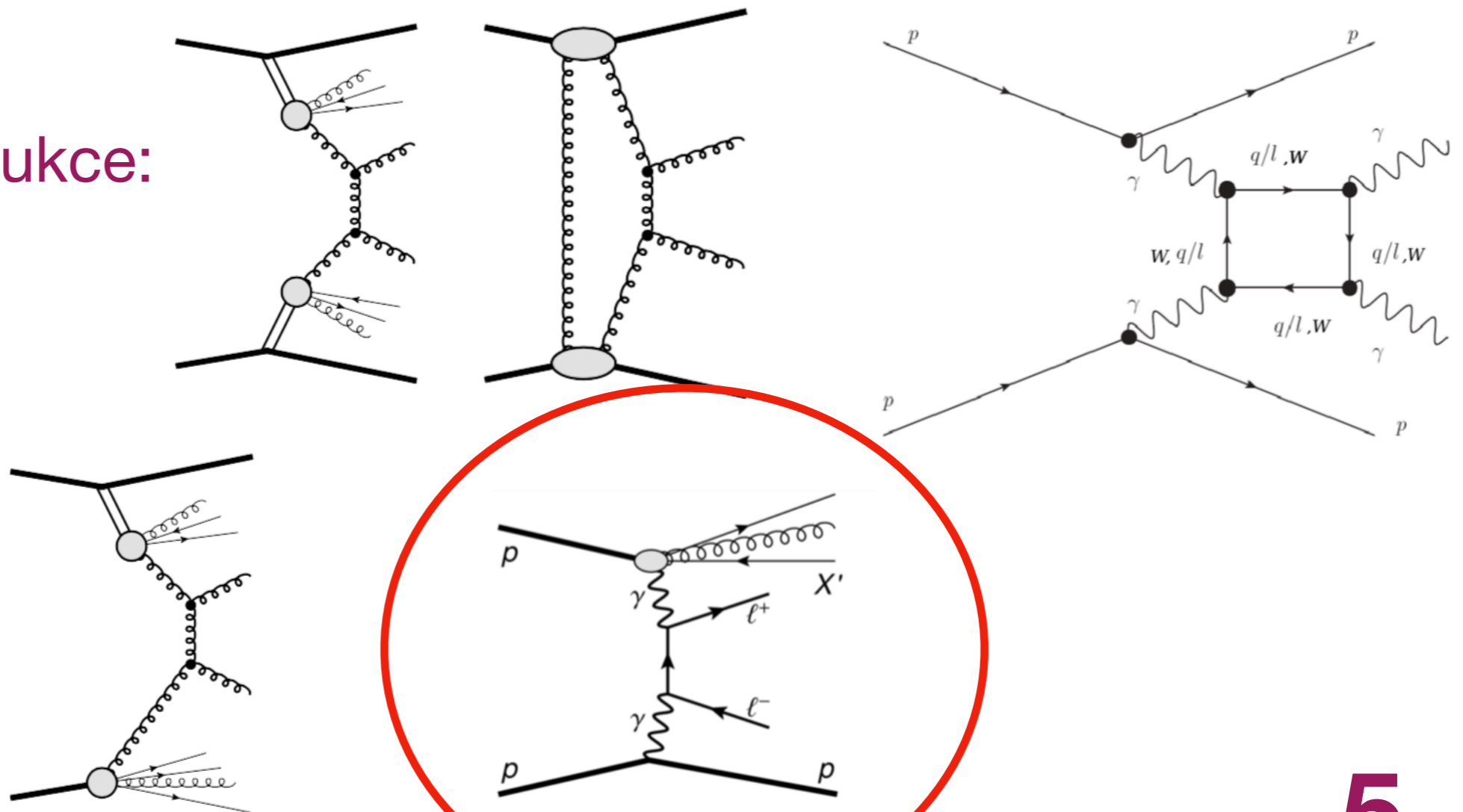
Disociace:



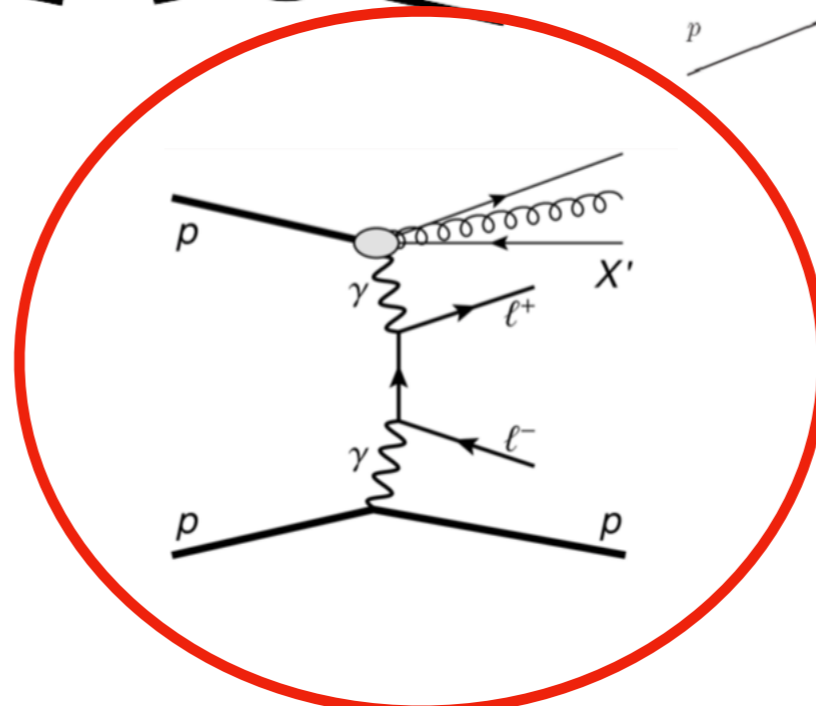
Fyzikální motivace

Difrakce

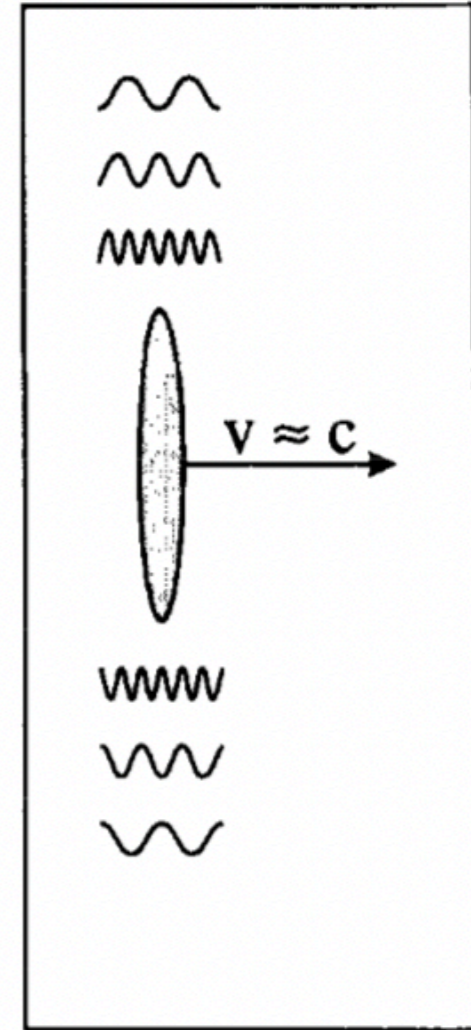
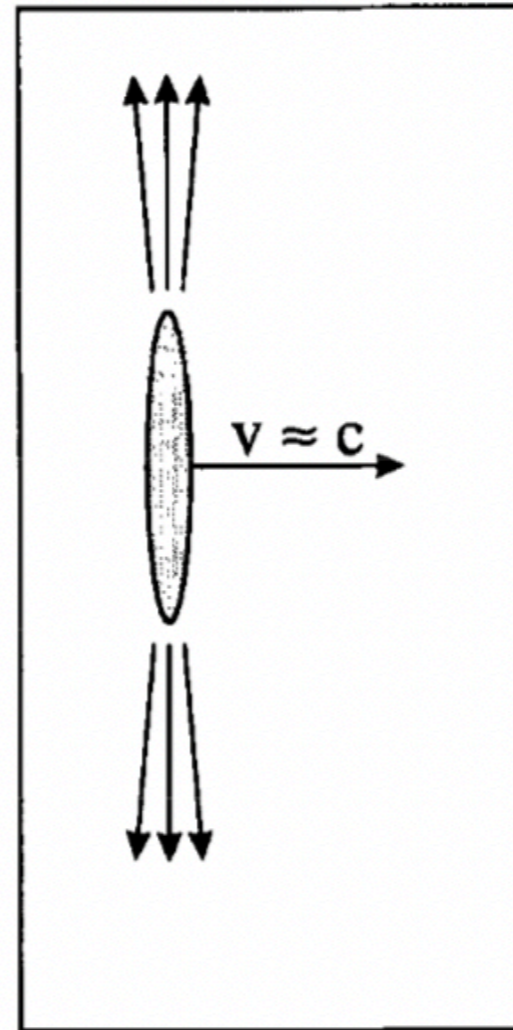
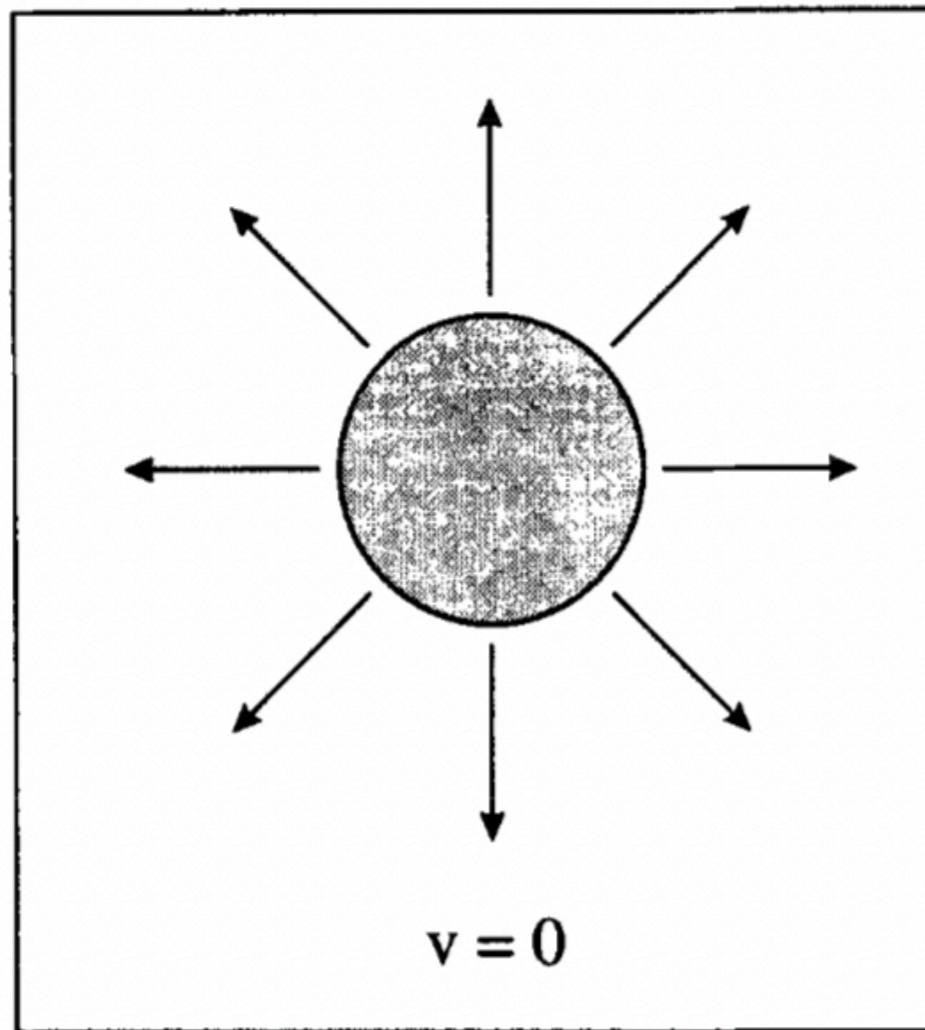
Exkluzivní produkce:



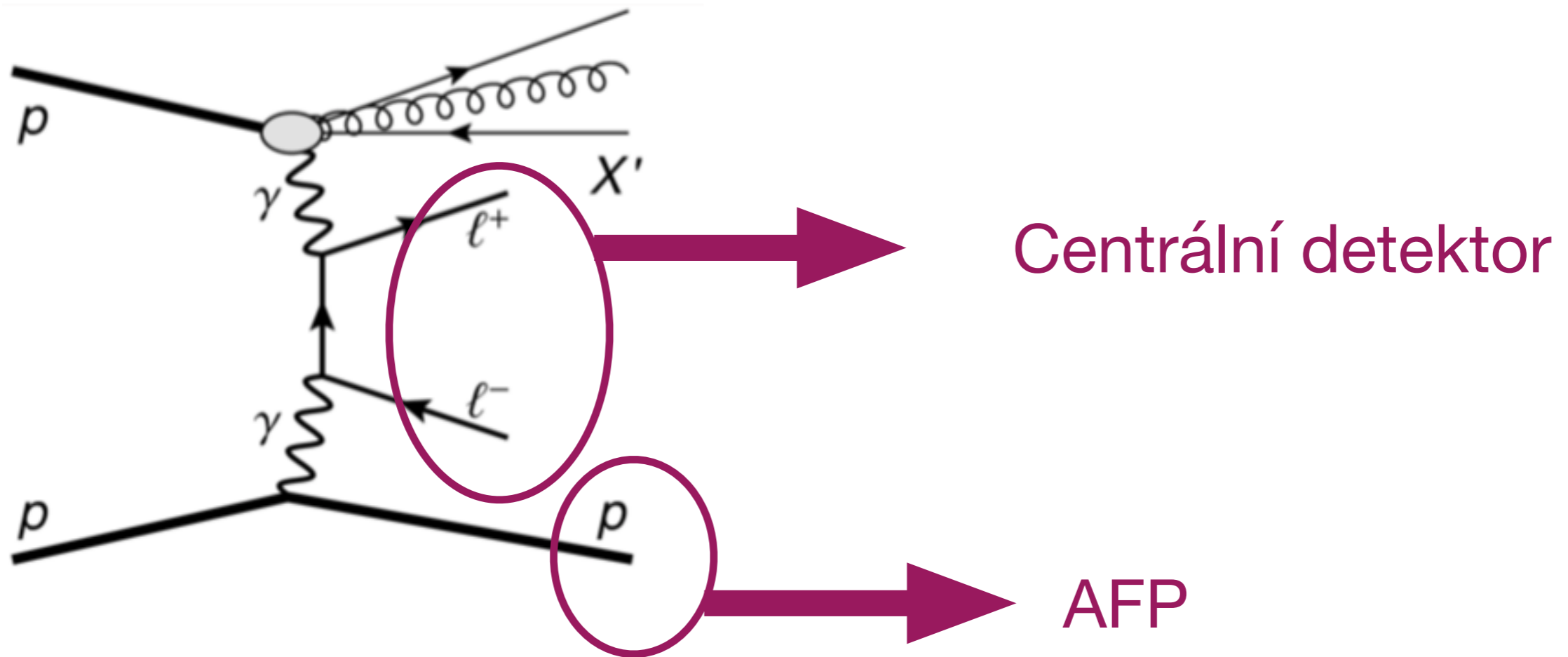
Disociace:



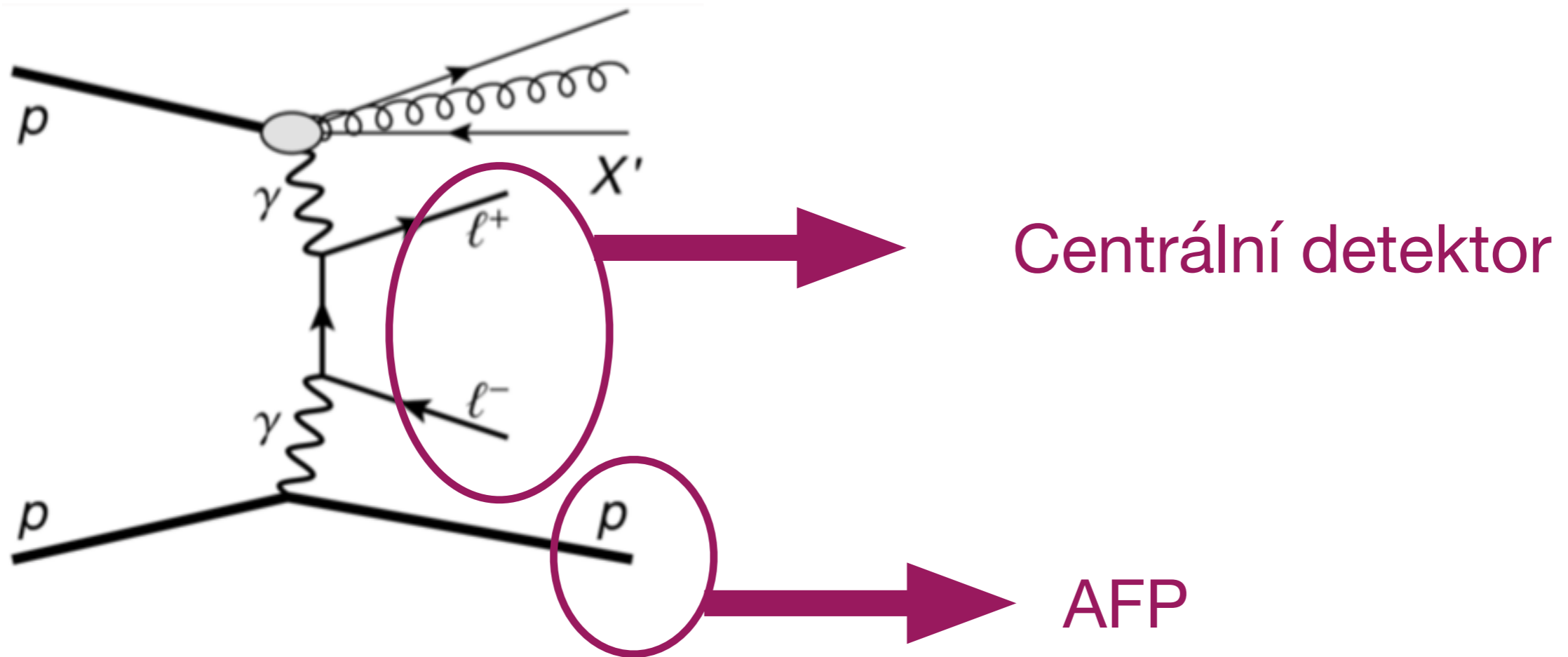
$\gamma\gamma \rightarrow \mu\mu$



Detektor ATLAS

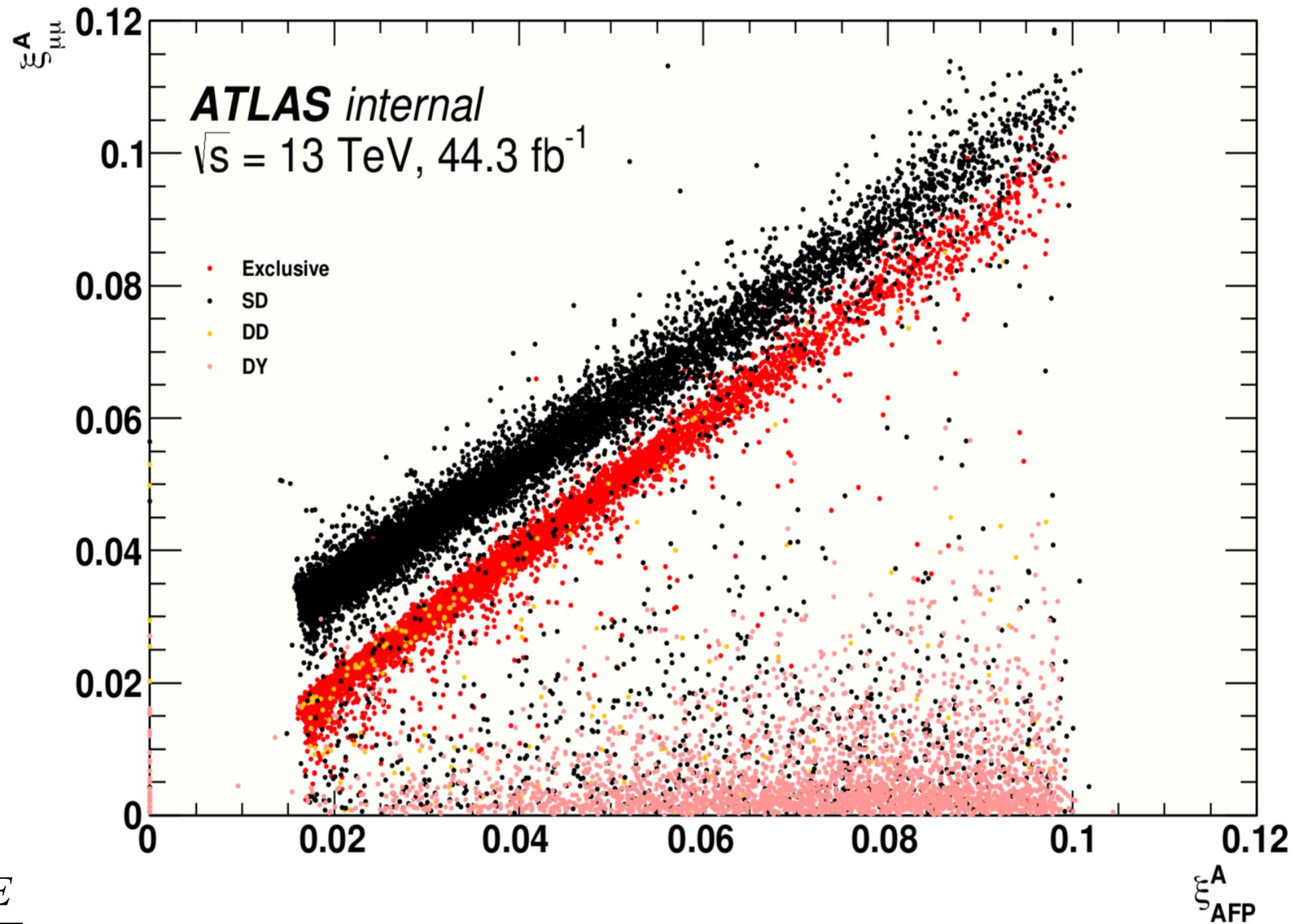


Detektor ATLAS



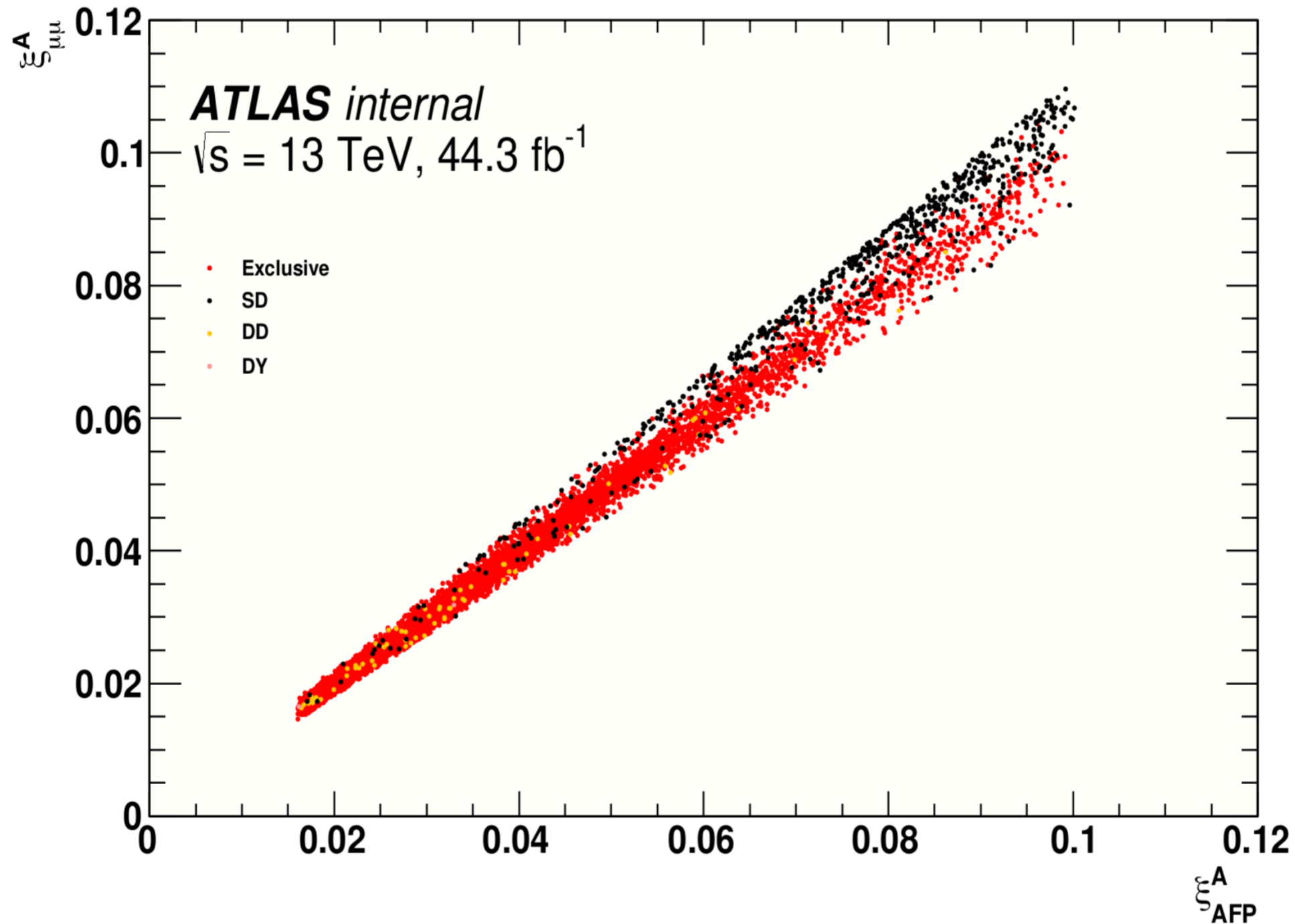
Výrazné potlačení pozadí

Detektor ATLAS

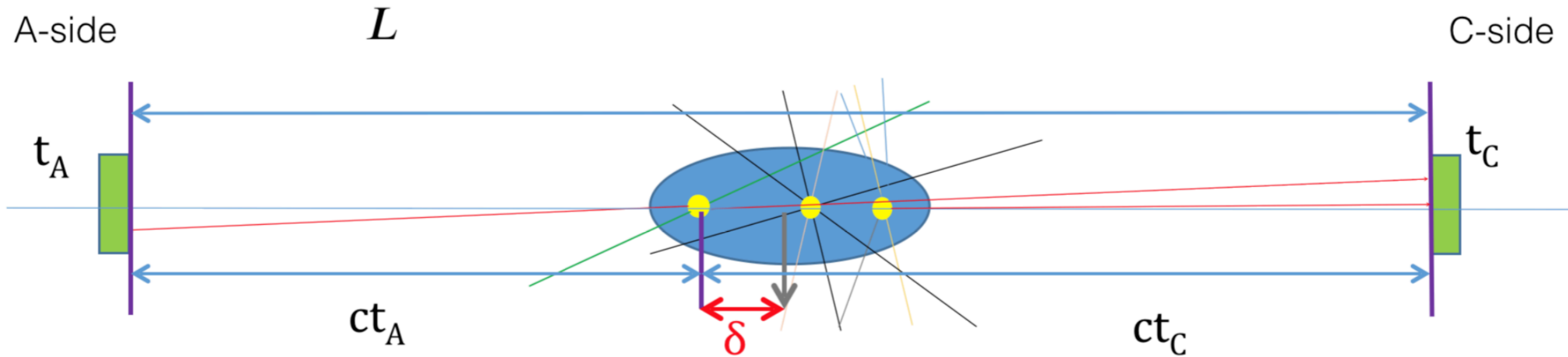


$$\xi = 1 - \frac{E}{E_0}$$

Detektor ATLAS

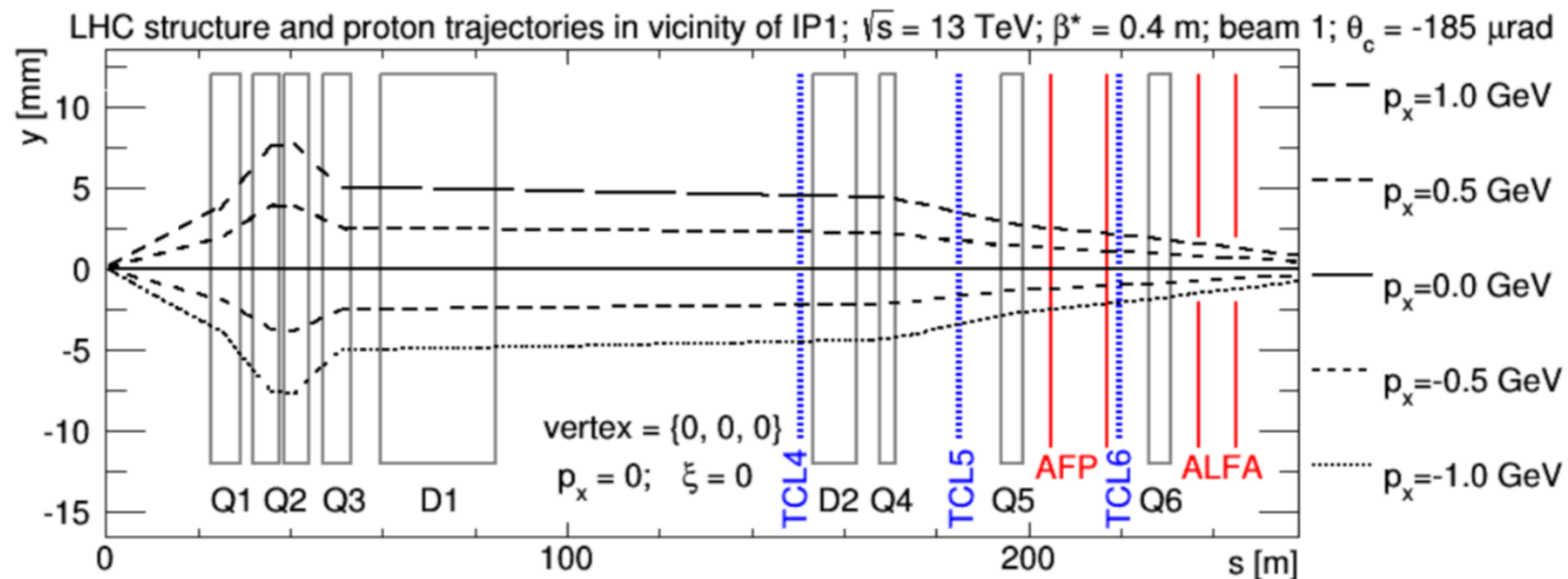
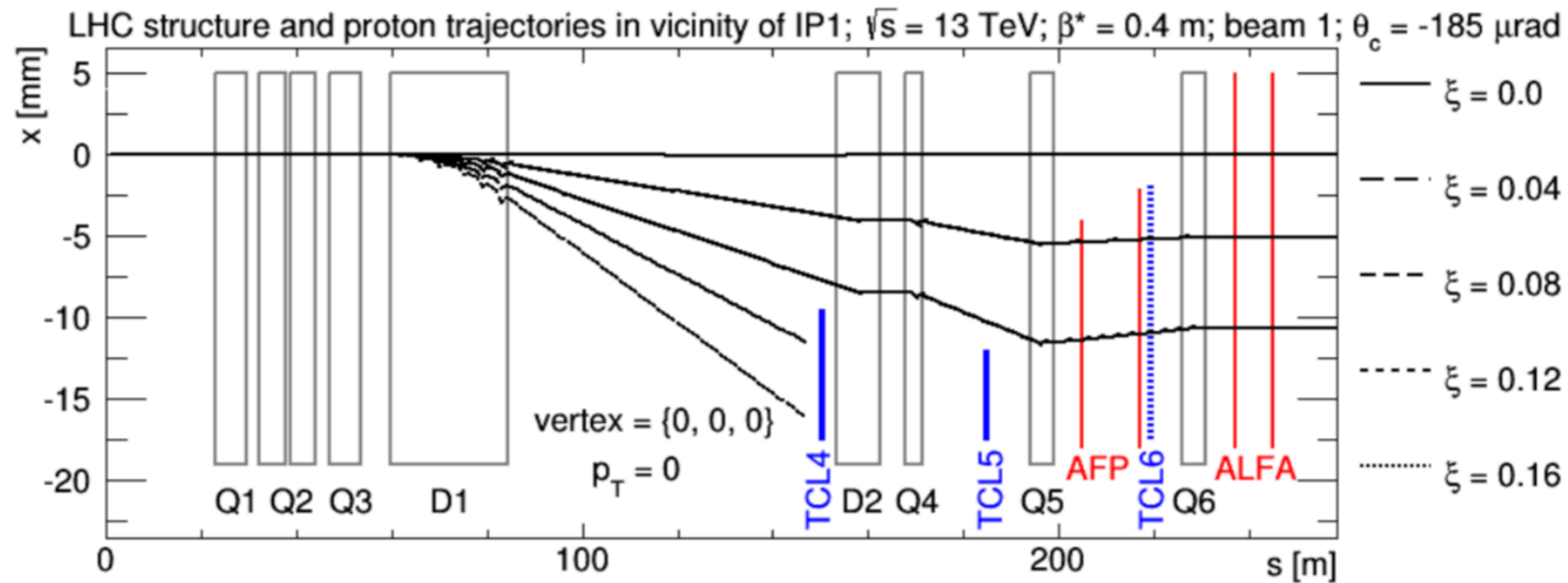


Detektor doby letu

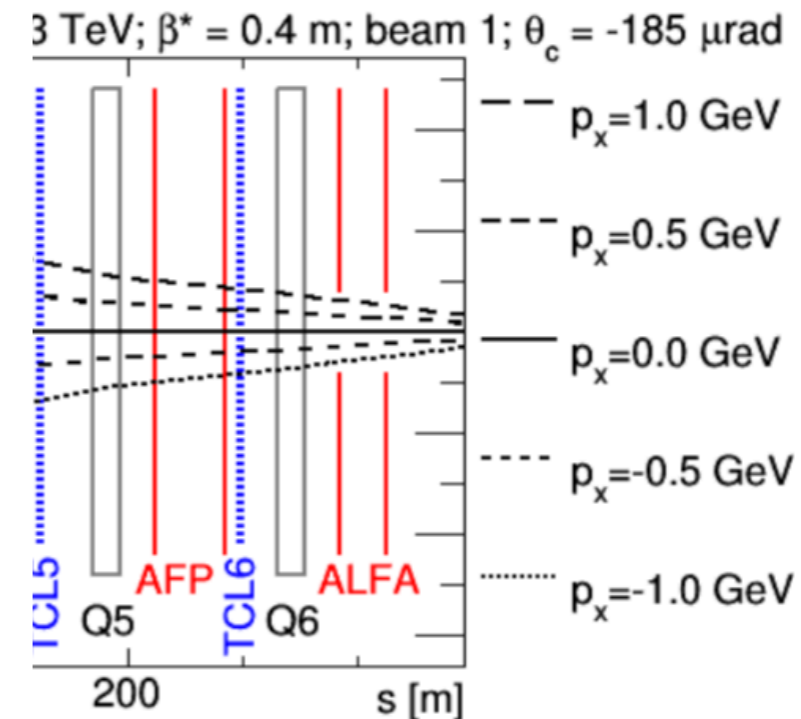
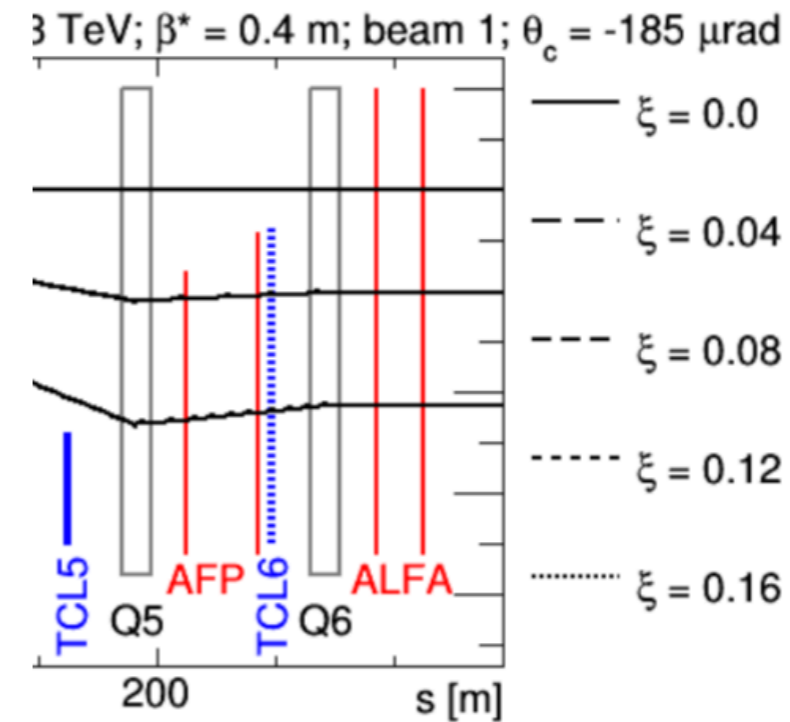
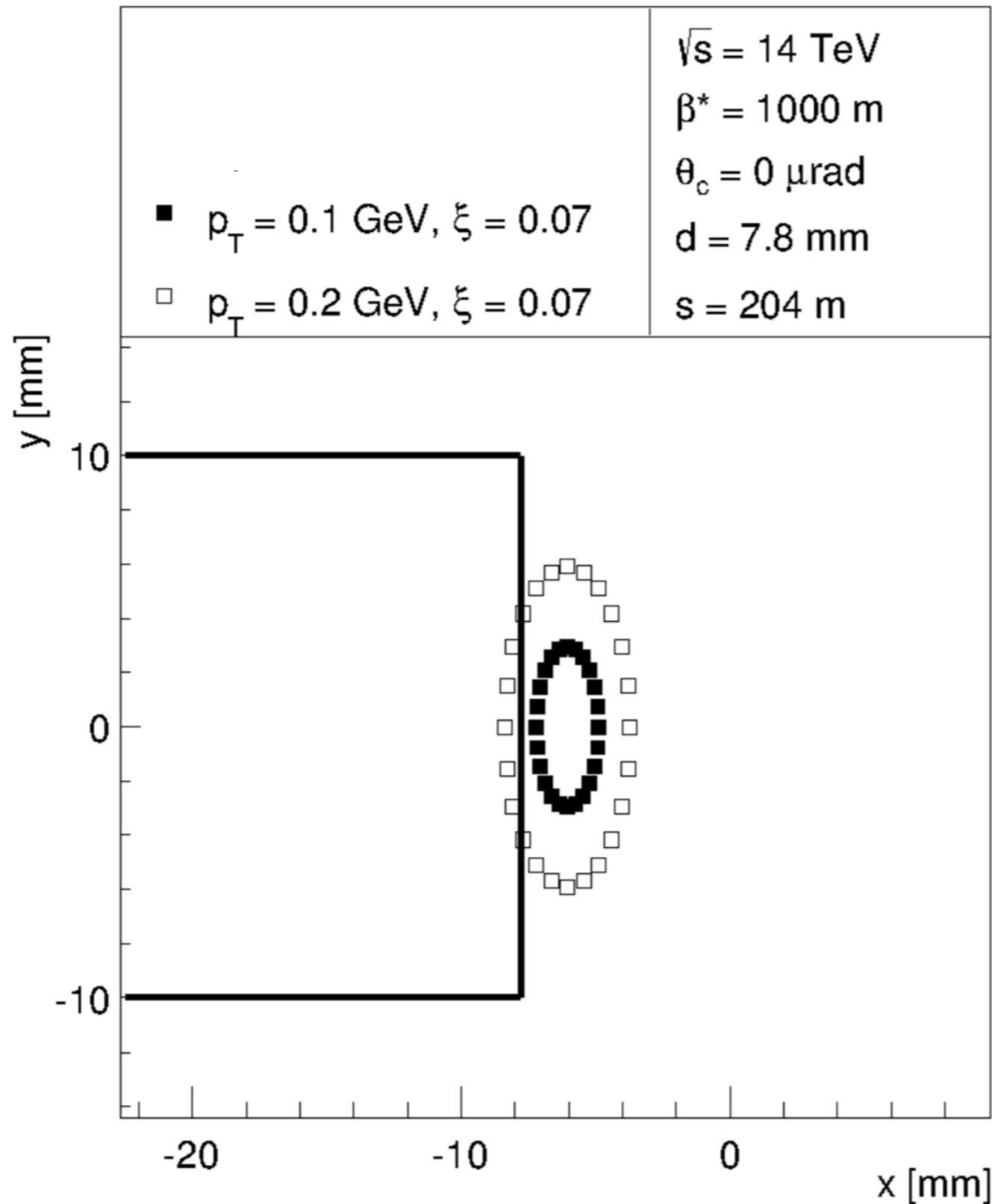


$$\delta = \frac{(t_A - t_C)}{2}c - z_{ATLAS}$$

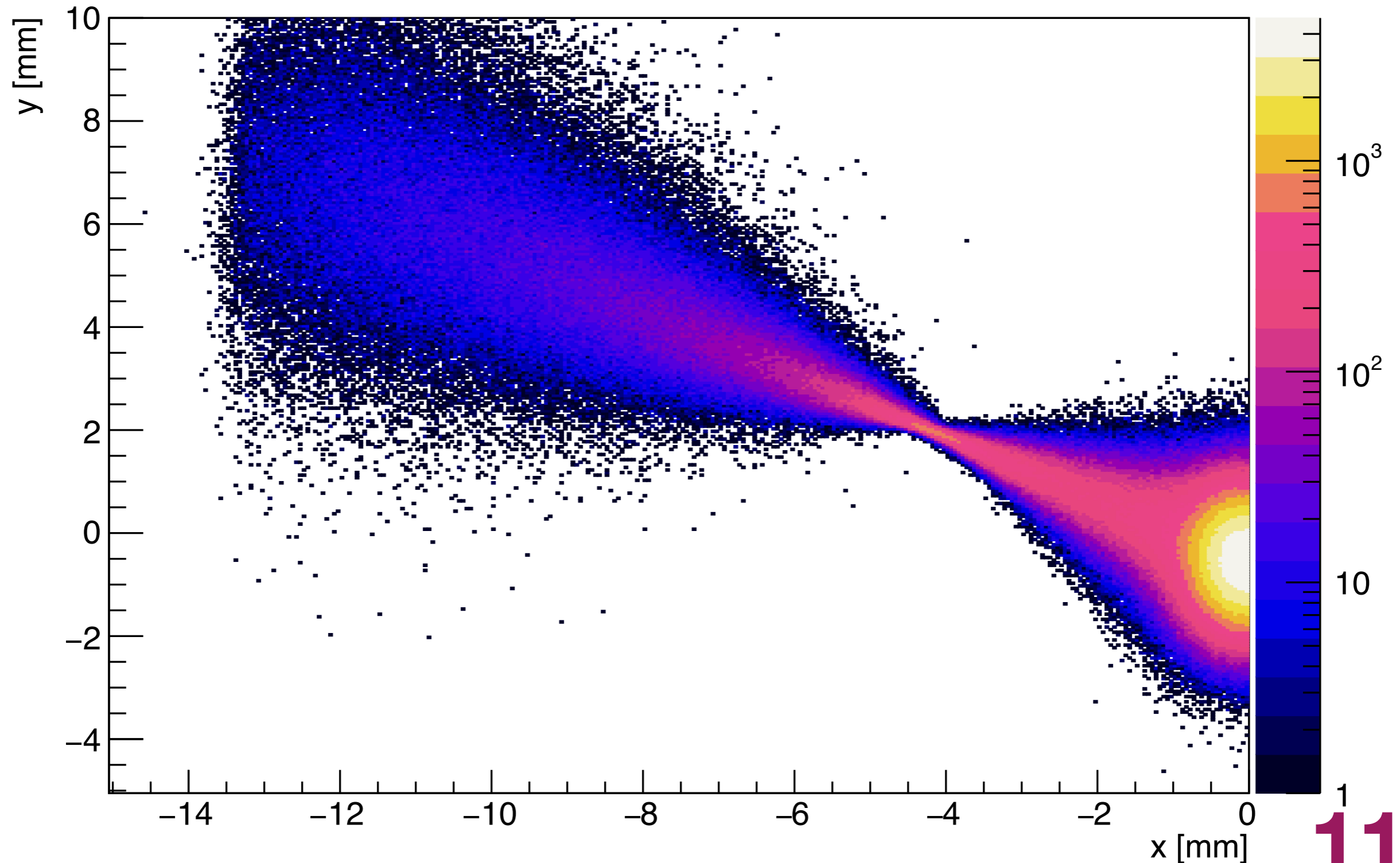
Křemíkový detektor



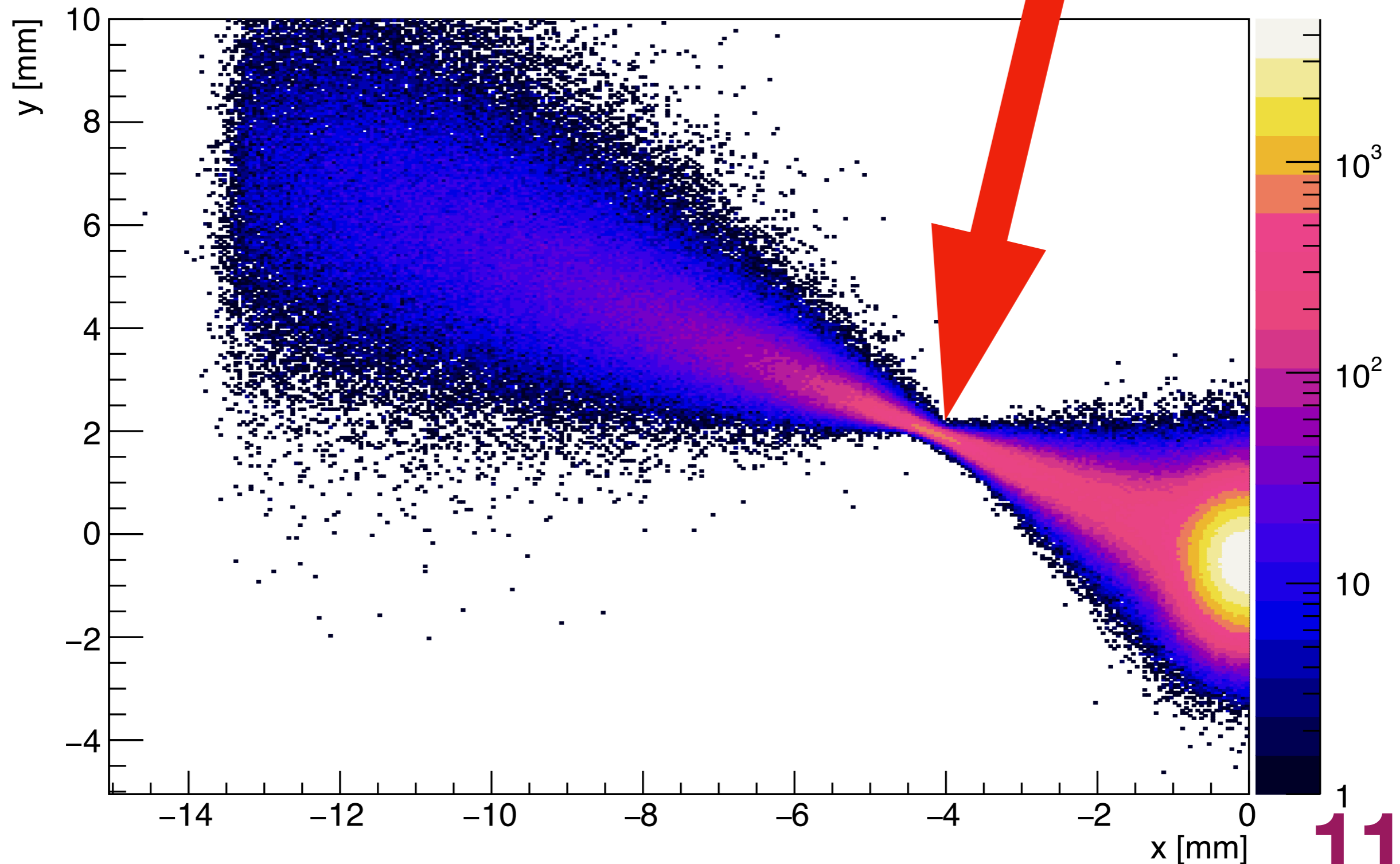
Křemíkový detektor



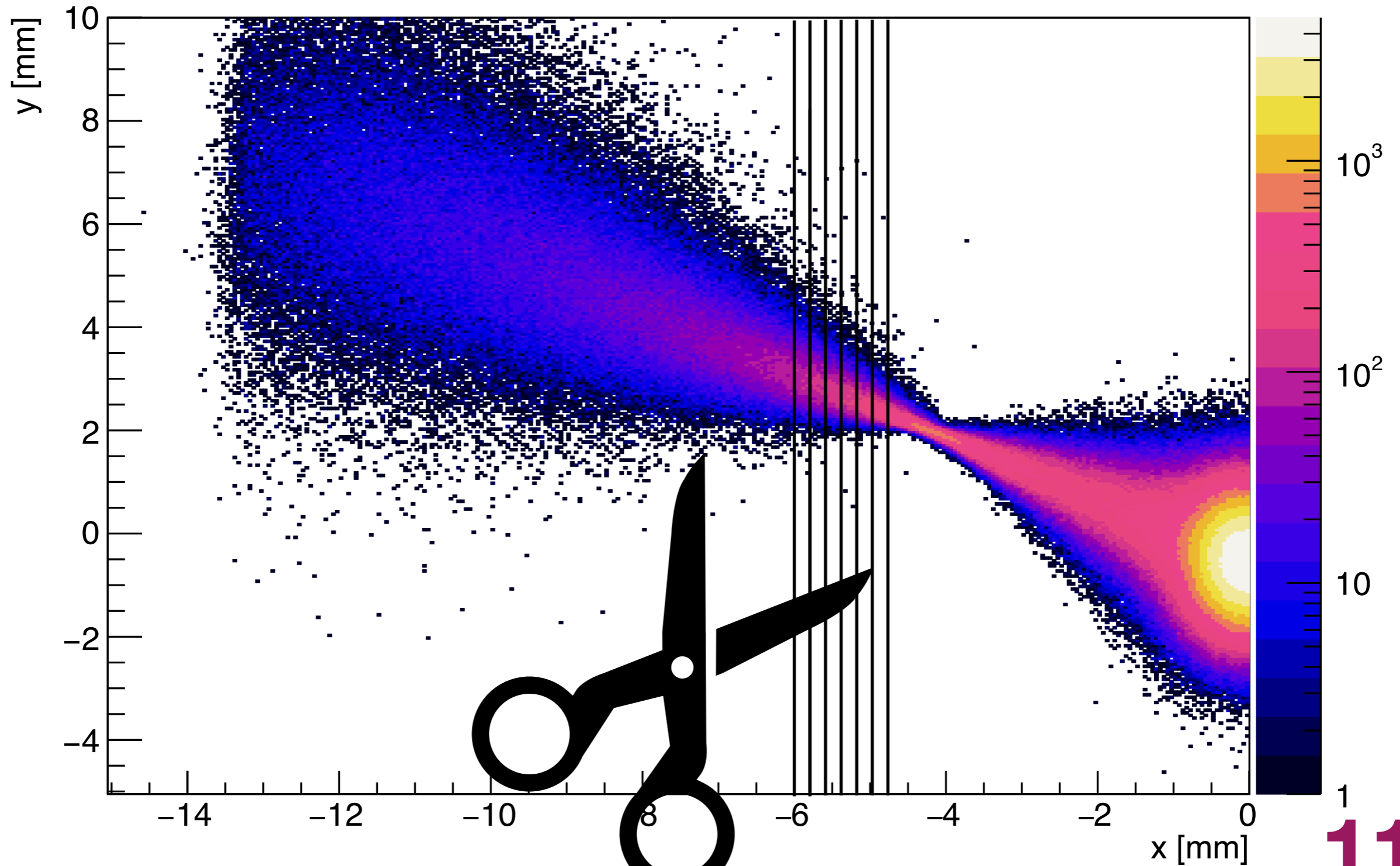
HOT-SPOT: charakteristická pozice detektoru, kde je rozdělení hitu neuzší



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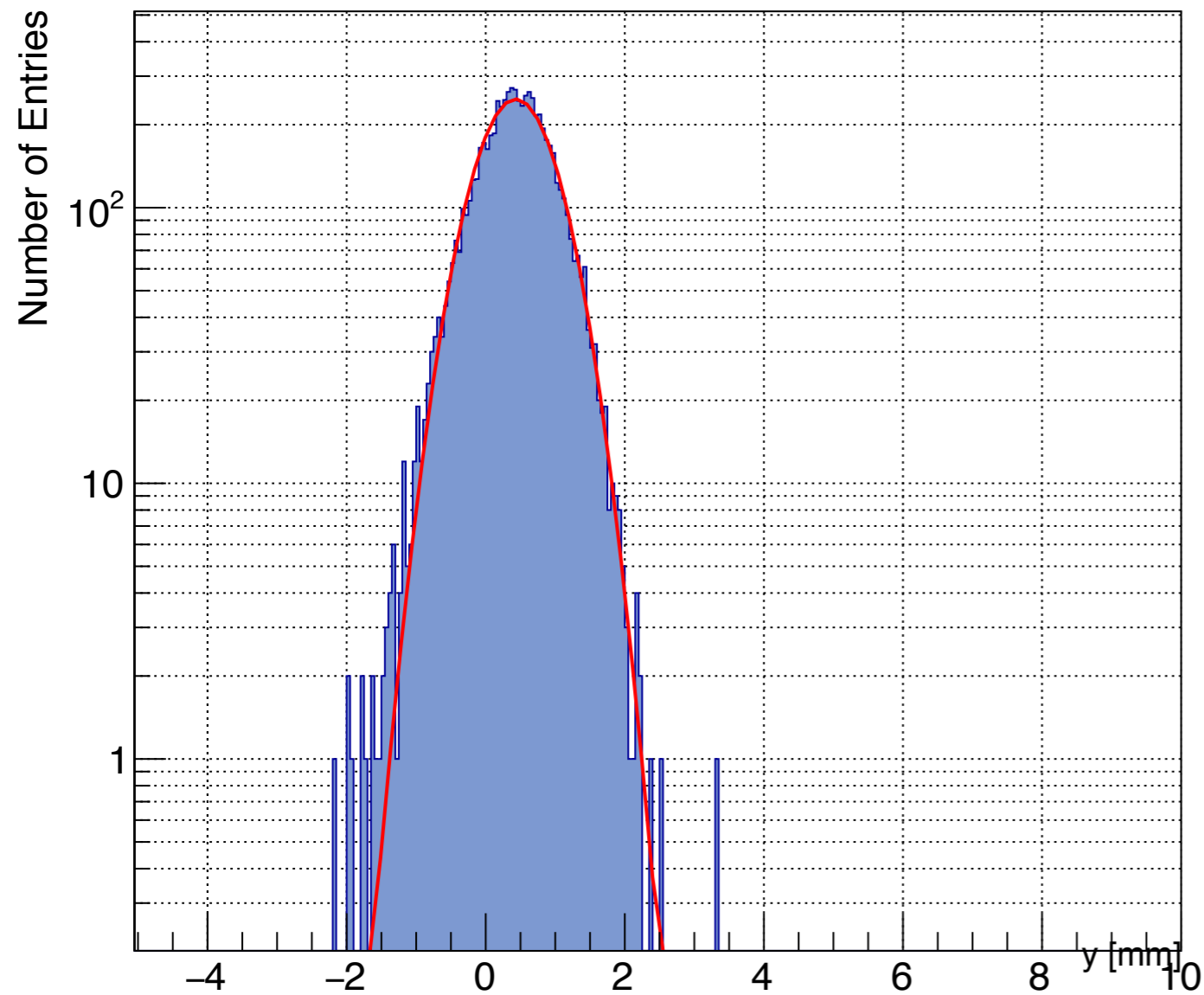


TProjection

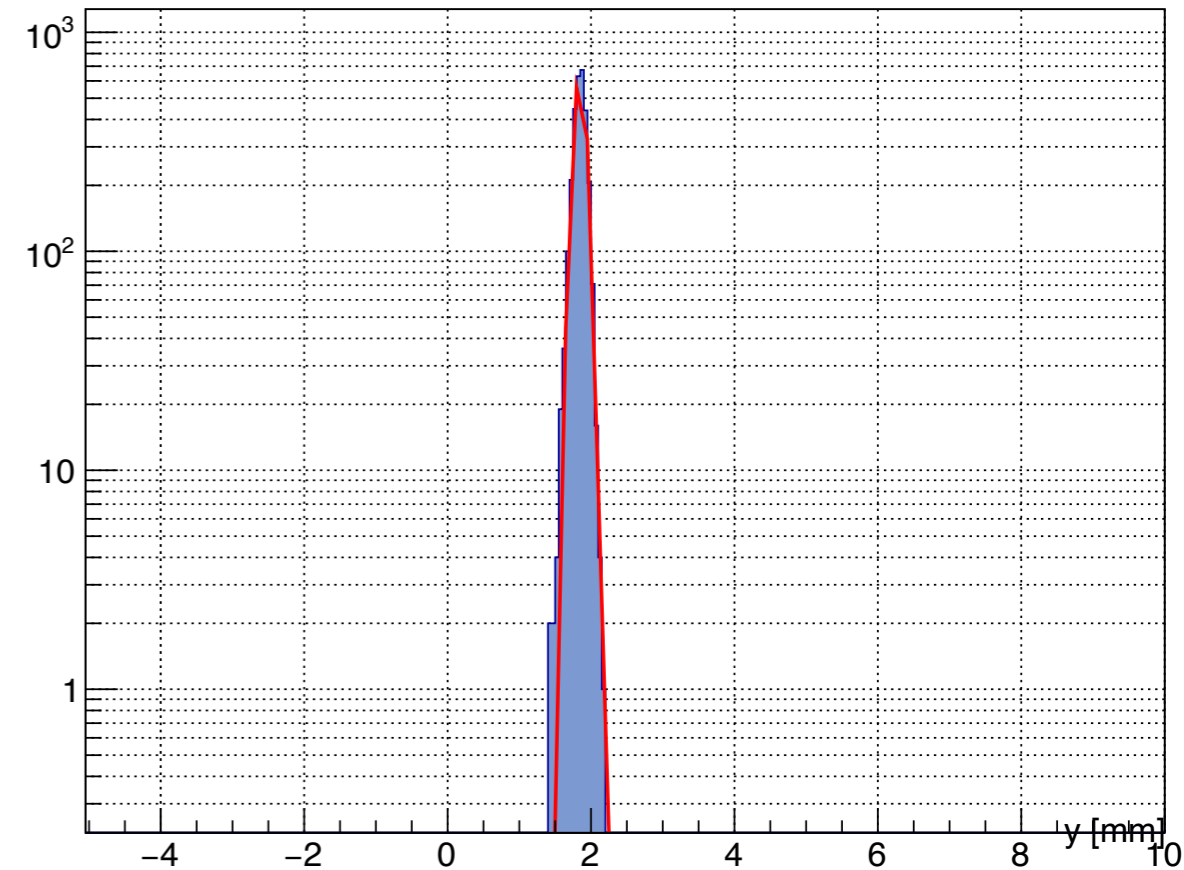


TProjection

ProjectionY of binx=466 [x=-1.75..-1.70]



ProjectionY of binx=422 [x=-3.95..-3.90]



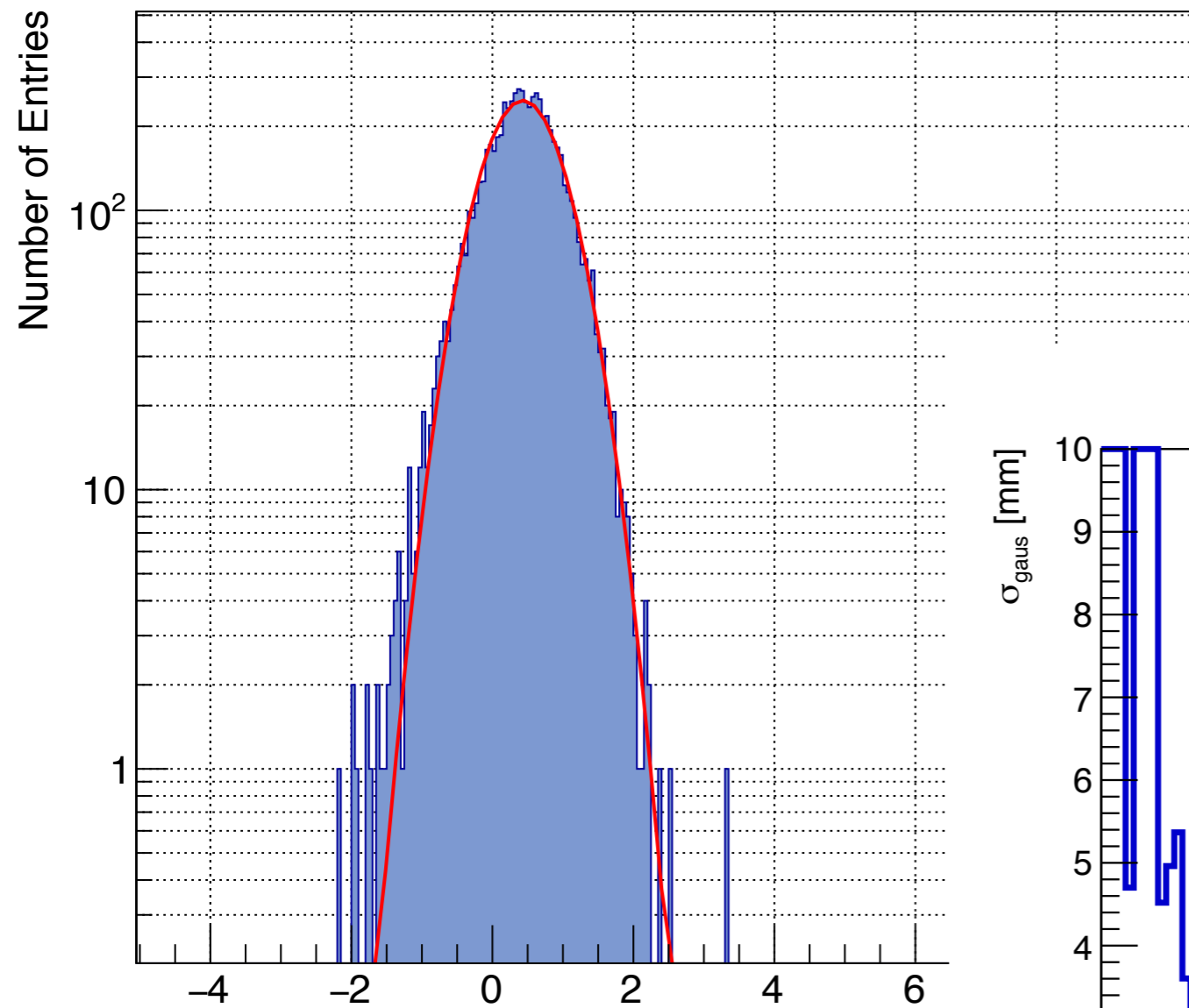
FitSlices

šířka gause

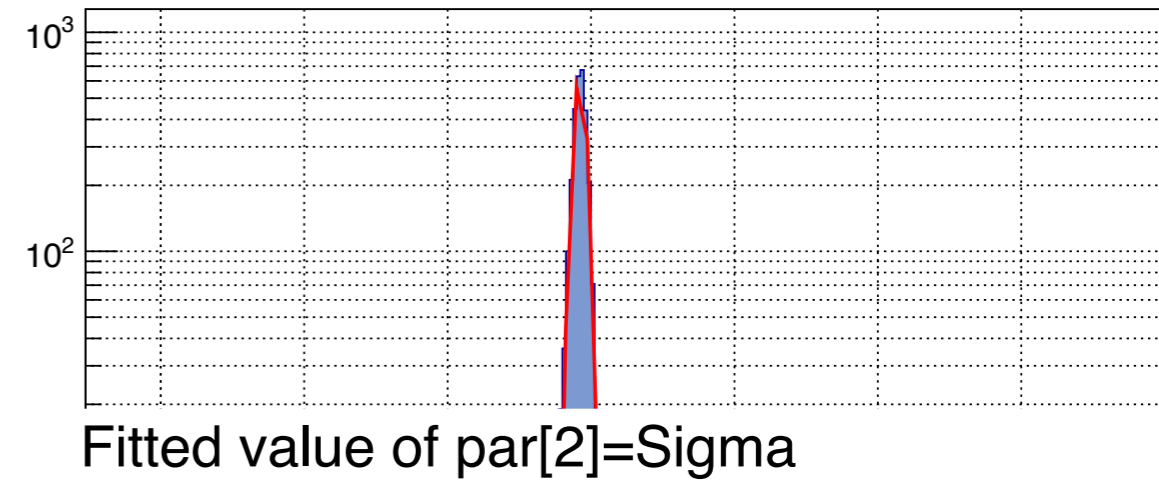
12/21

TProjection

ProjectionY of binx=466 [x=-1.75..-1.70]



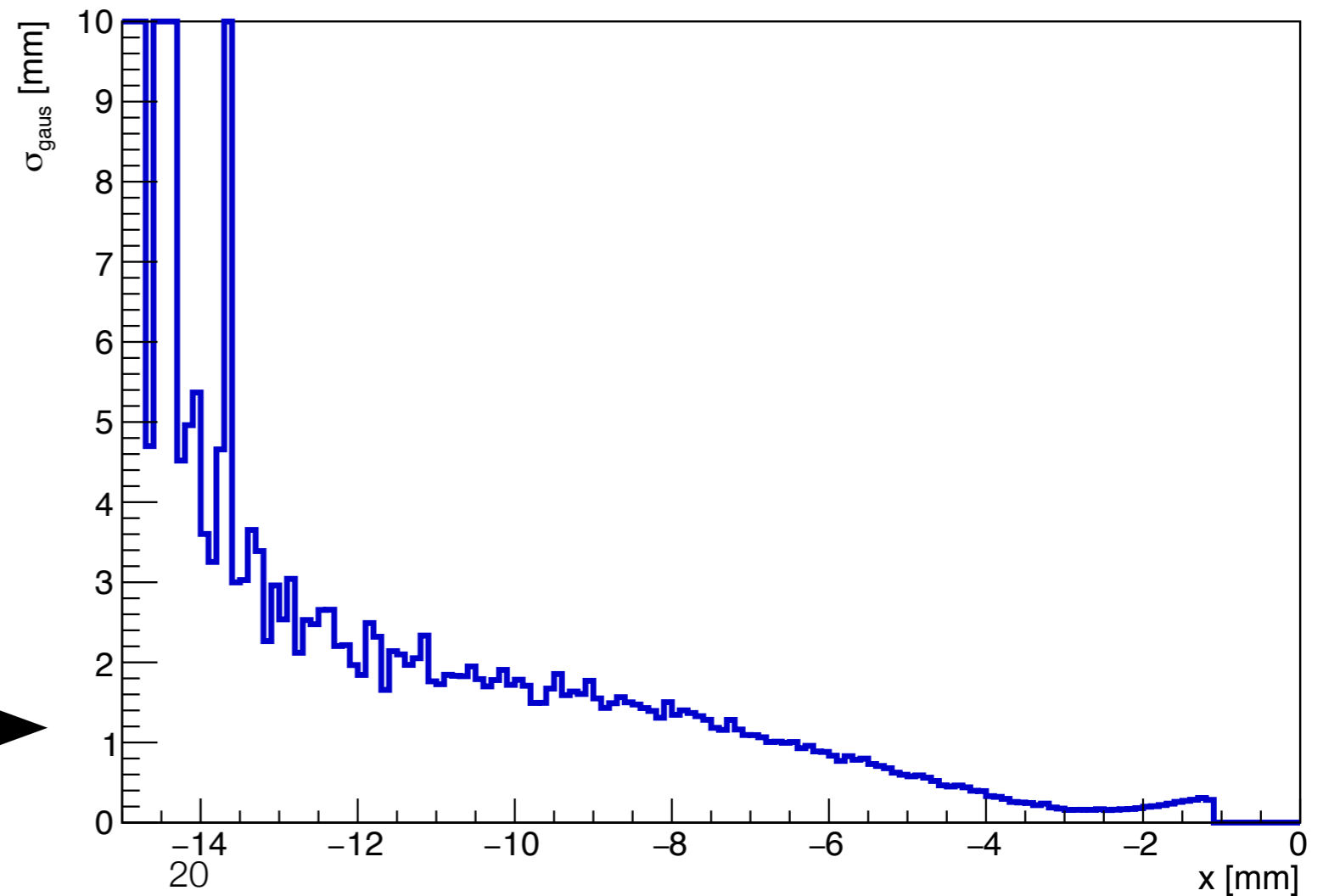
ProjectionY of binx=422 [x=-3.95..-3.90]



Fitted value of par[2]=Sigma

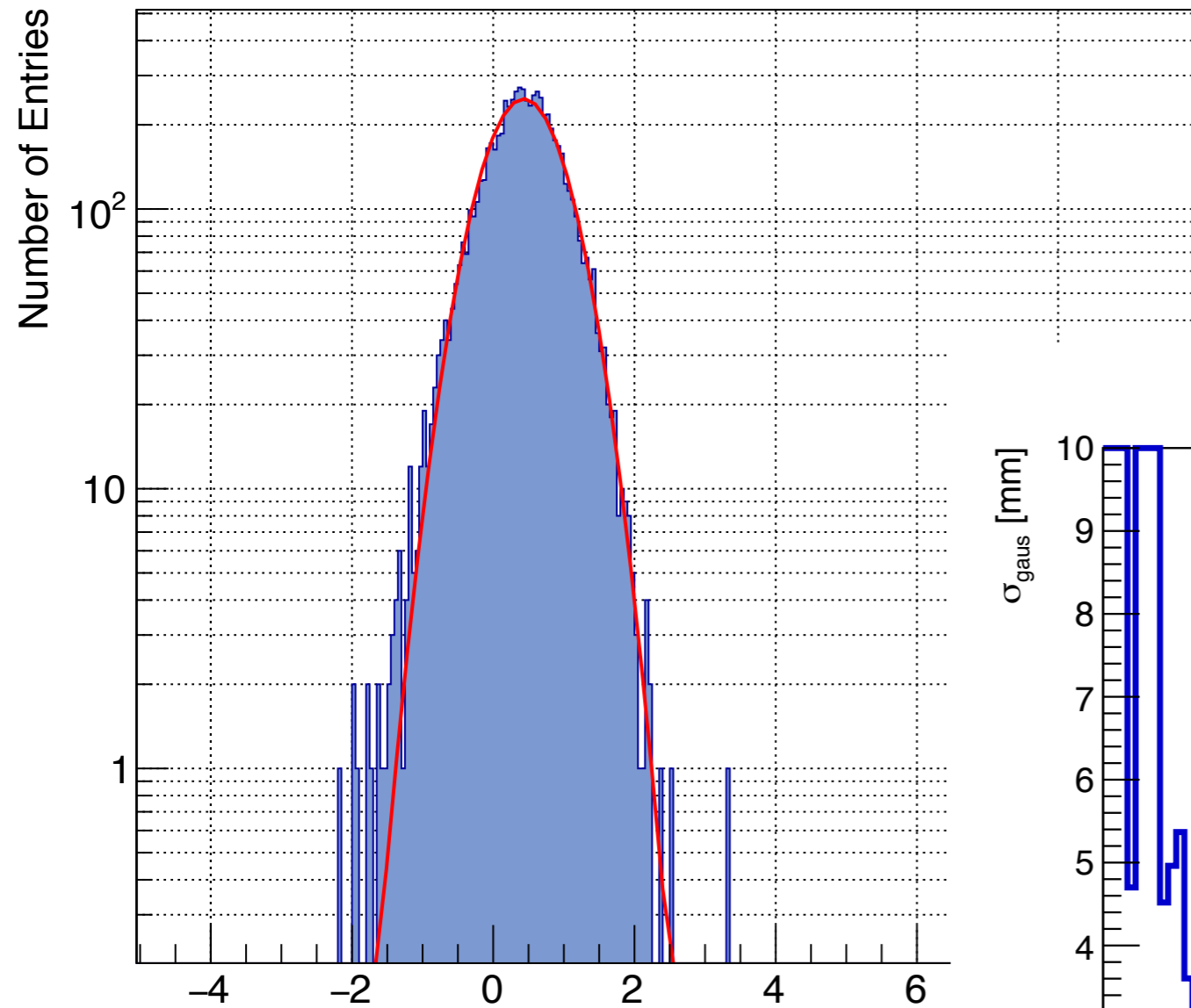


FitSlices

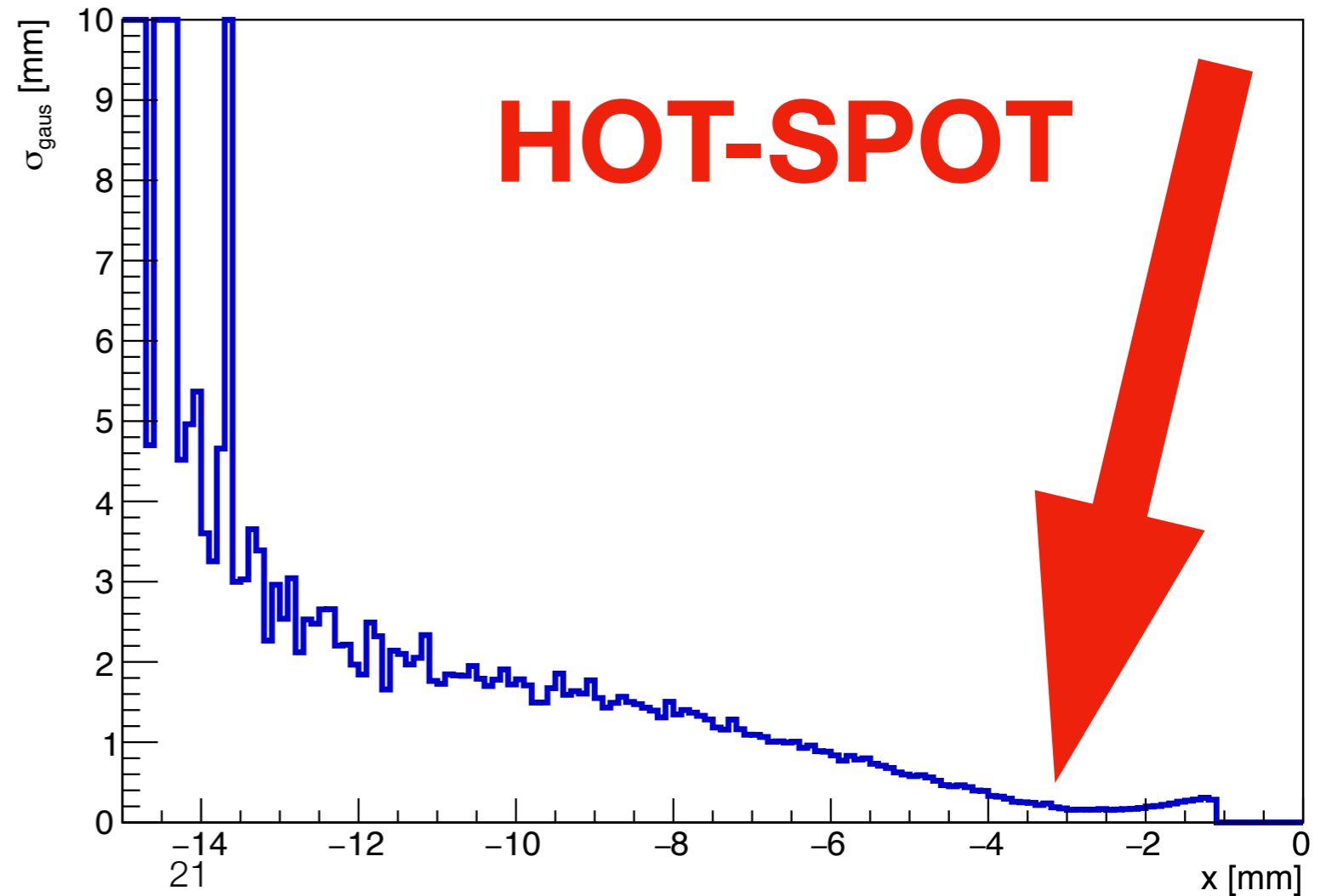
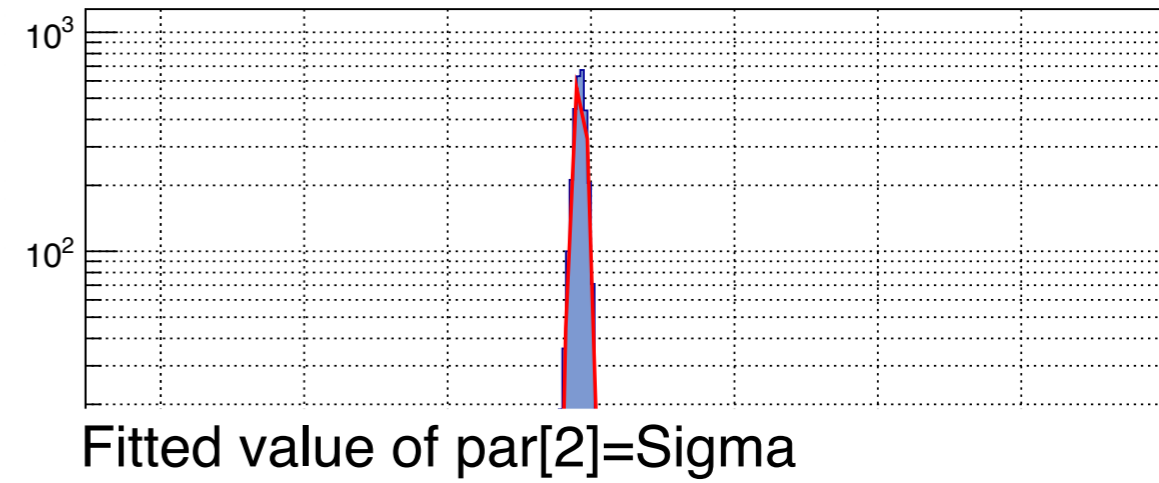


TProjection

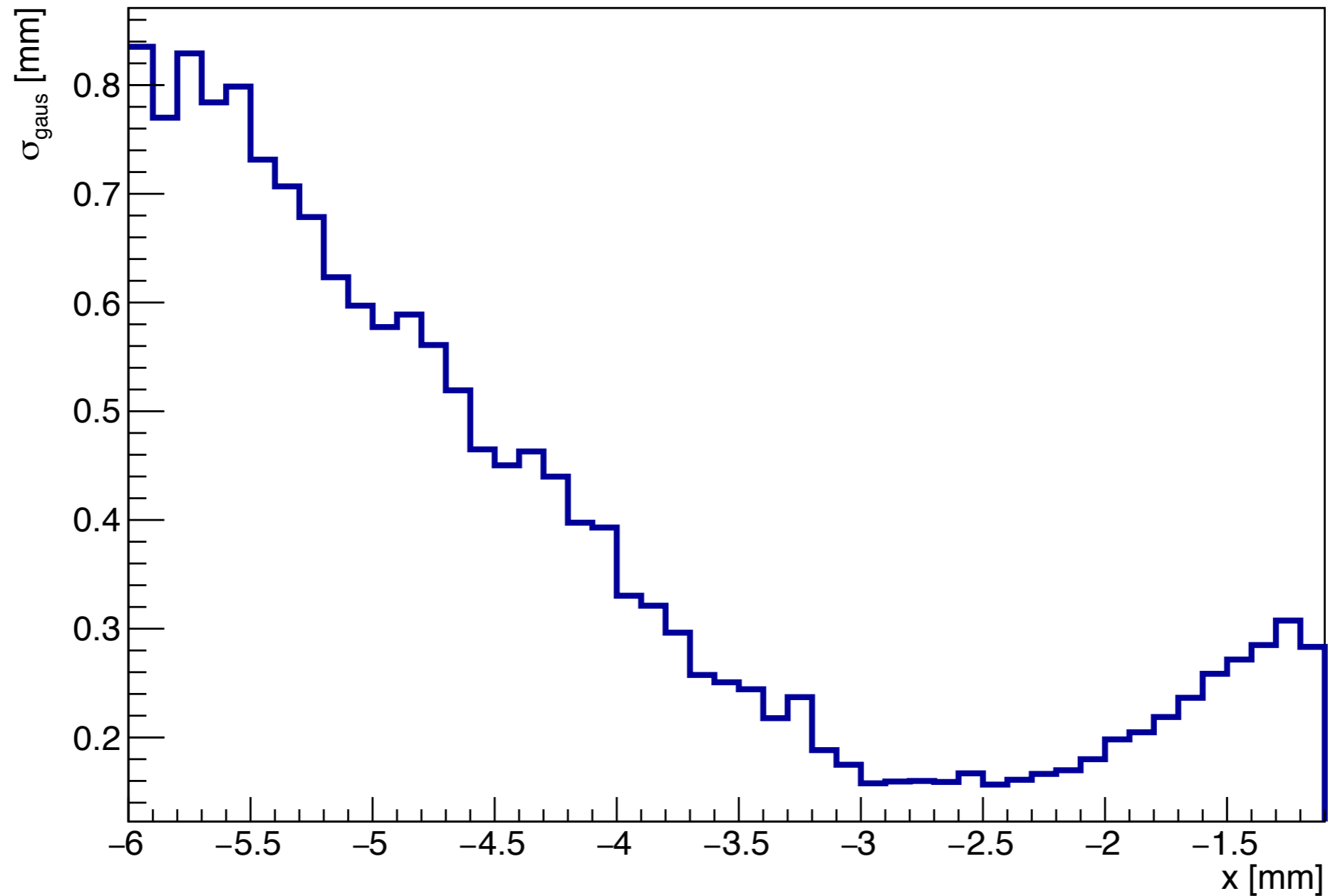
ProjectionY of binx=466 [x=-1.75..-1.70]



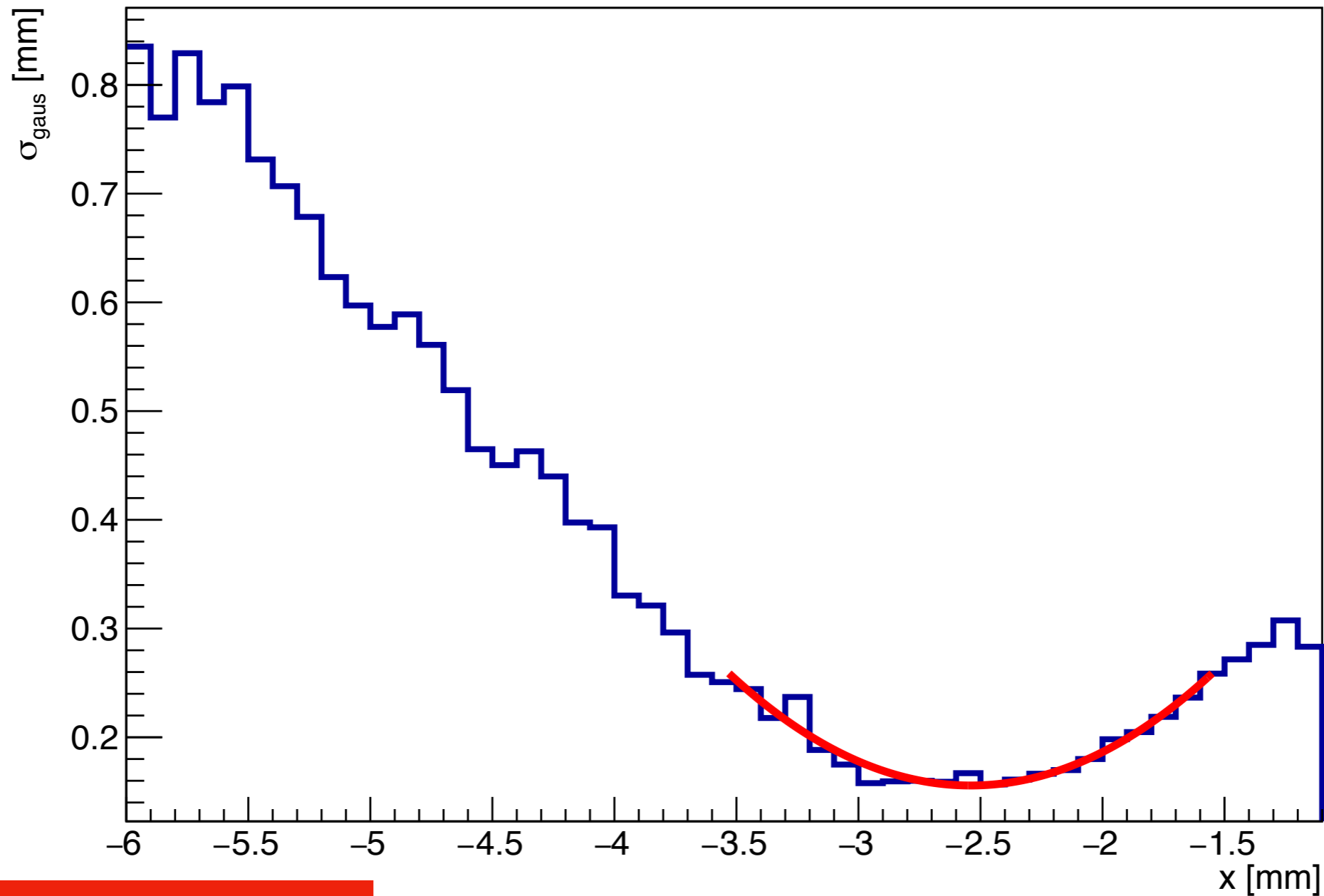
ProjectionY of binx=422 [x=-3.95..-3.90]



TProjection



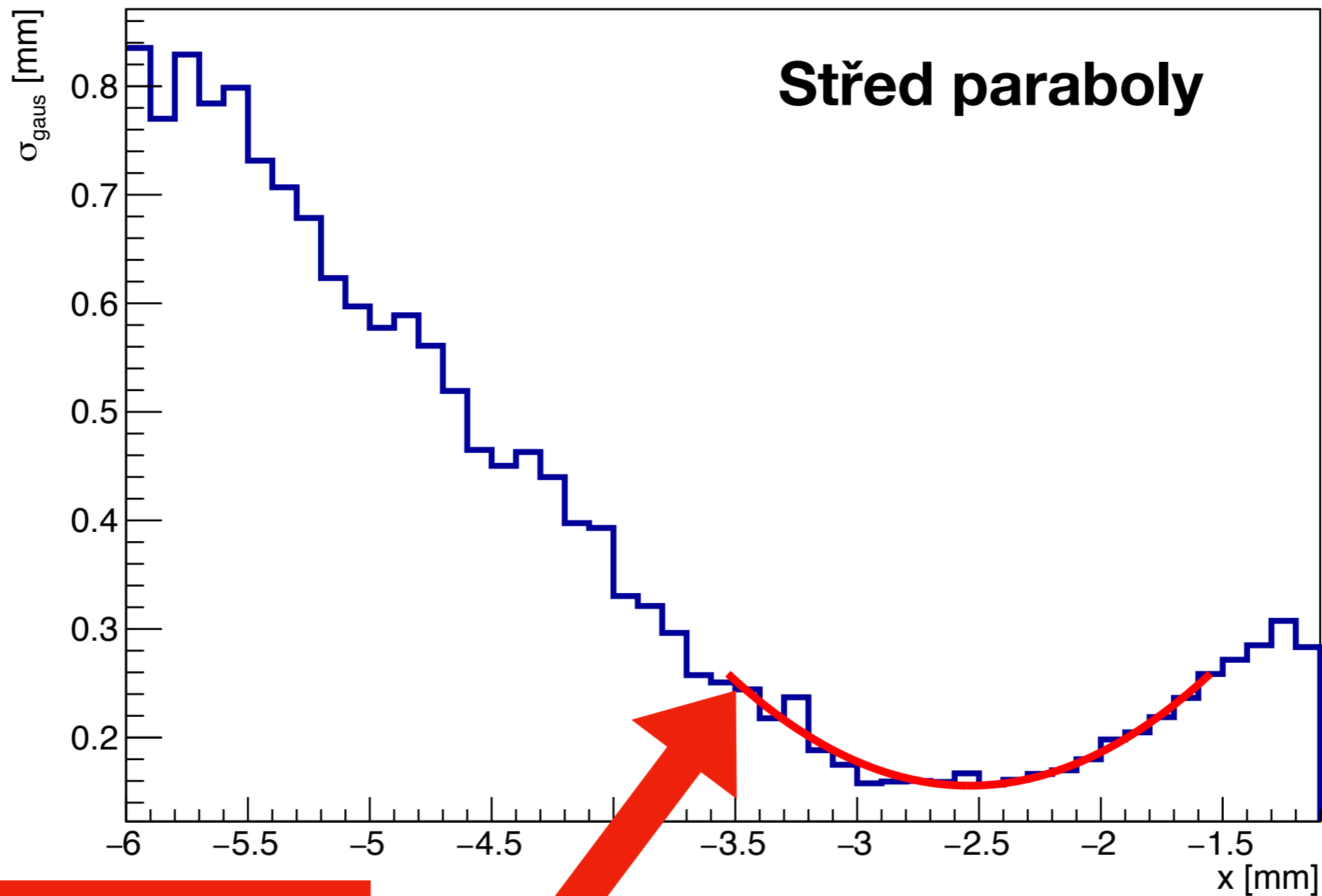
TProjection



Polynom druhého řádu

$$f(x) = [0] + [1]x + [2]x^2$$

TProjection



Polynom druhého řádu

$$f(x) = [0] + [1]x + [2]x^2$$

TProjection

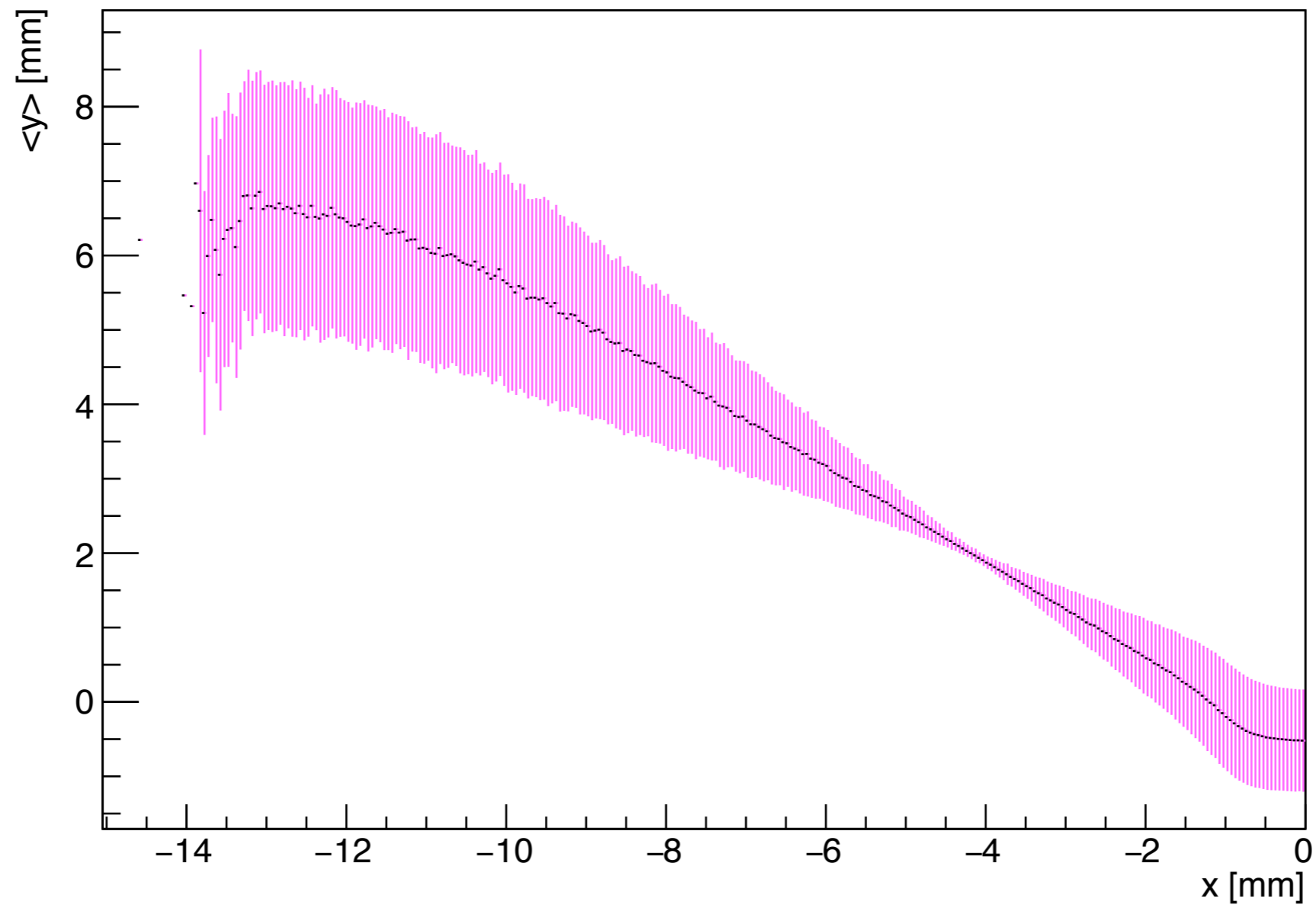
1. 2-D histogram
2. Vystřihneme každý x bin
3. Fitneme gausem
4. Vyneseme šířky gausů
5. Najdeme minimum, pomocí fitu parabolou

— Nevýhody

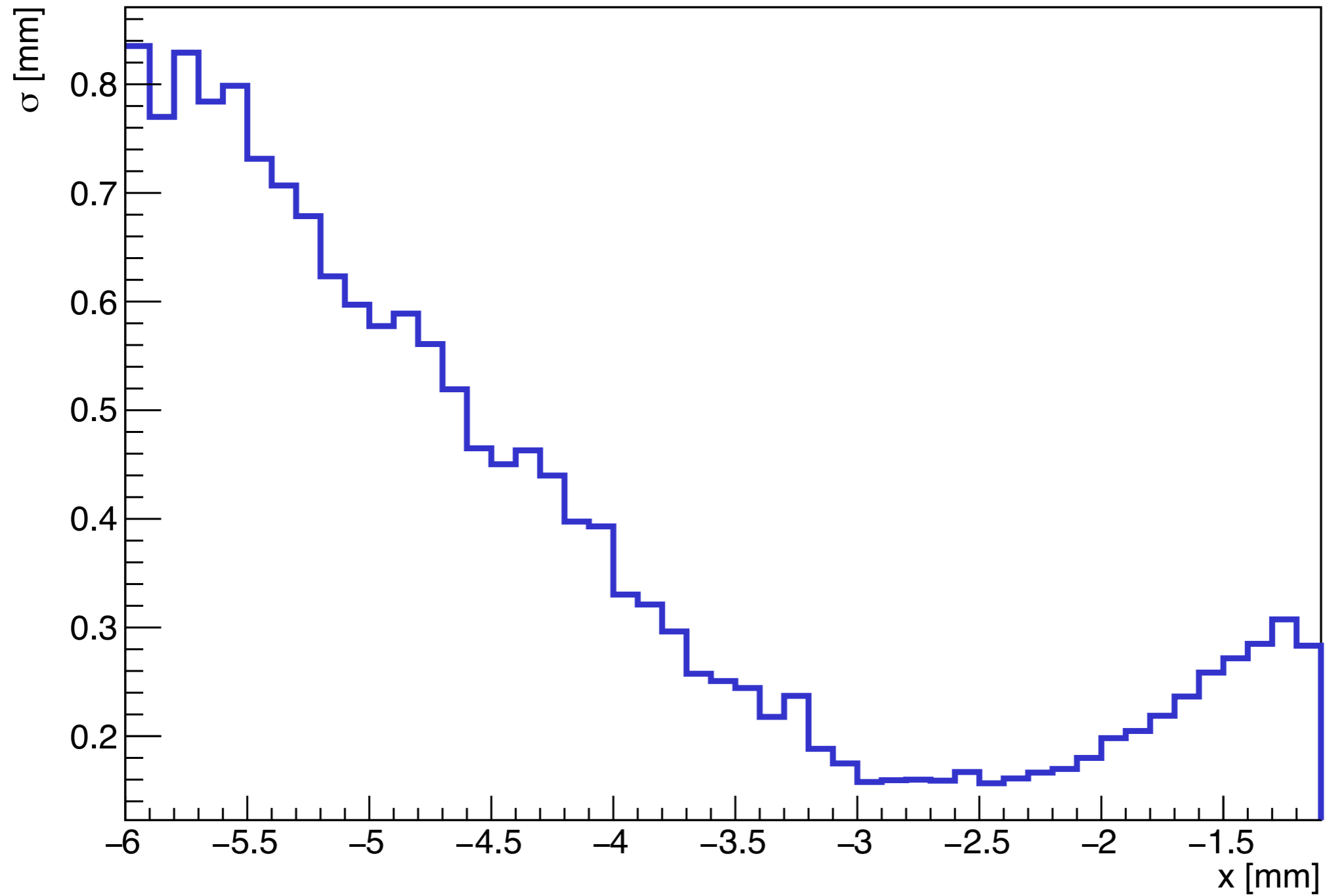
Distribuce není gausovská

Záleží na velikosti y binu

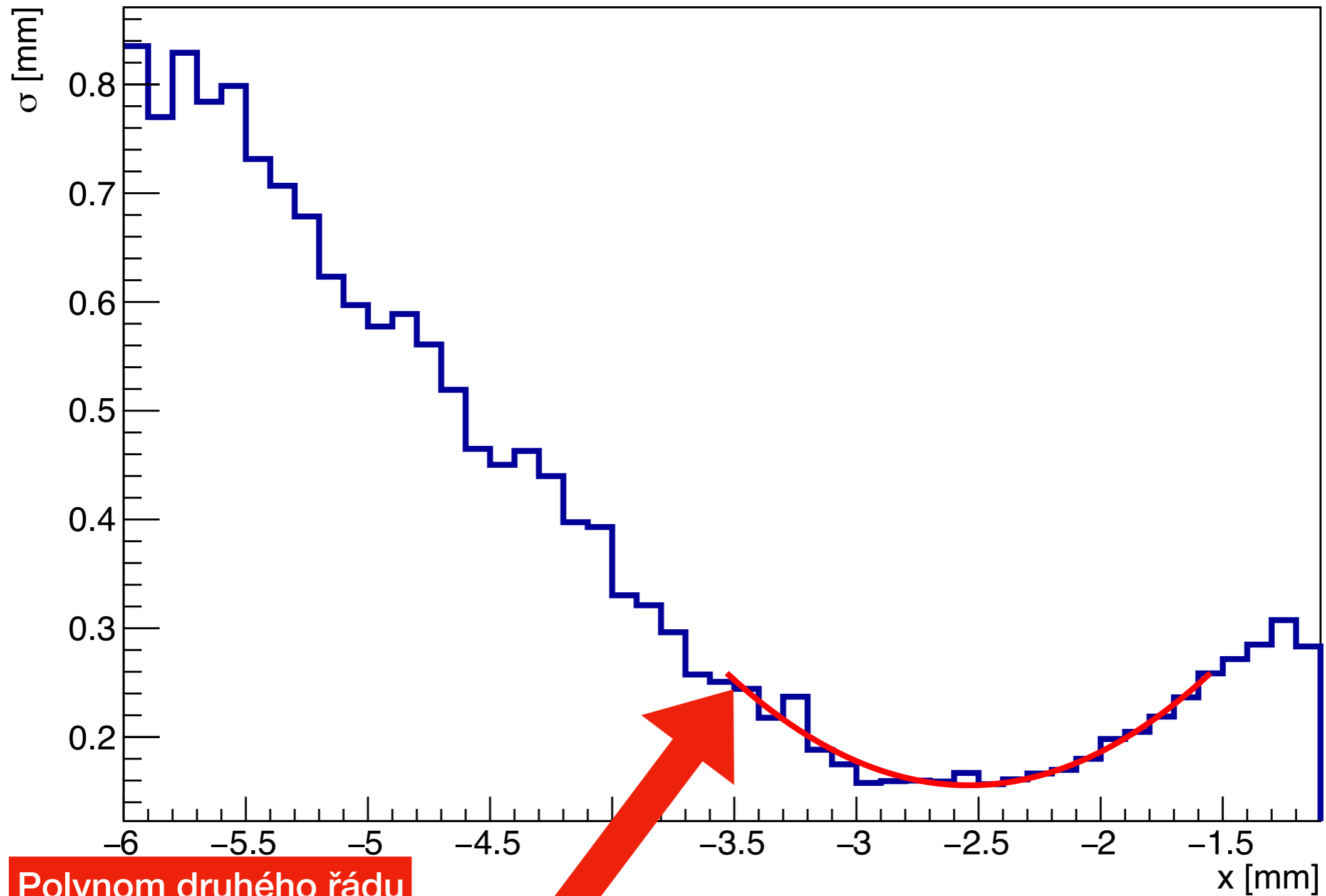
TProfile



TProfile



TProfile



Polynom druhého řádu

$$f(x) = [0] + [1]x + [2]x^2$$

TProfile

1. Naplní každý x bin střední hodnotou y
2. Chyba je směrodatná odchylka
3. Chyby vykreslíme
4. Najdeme minimum fitem



Výhoda

Nezáleží na velikosti y binu

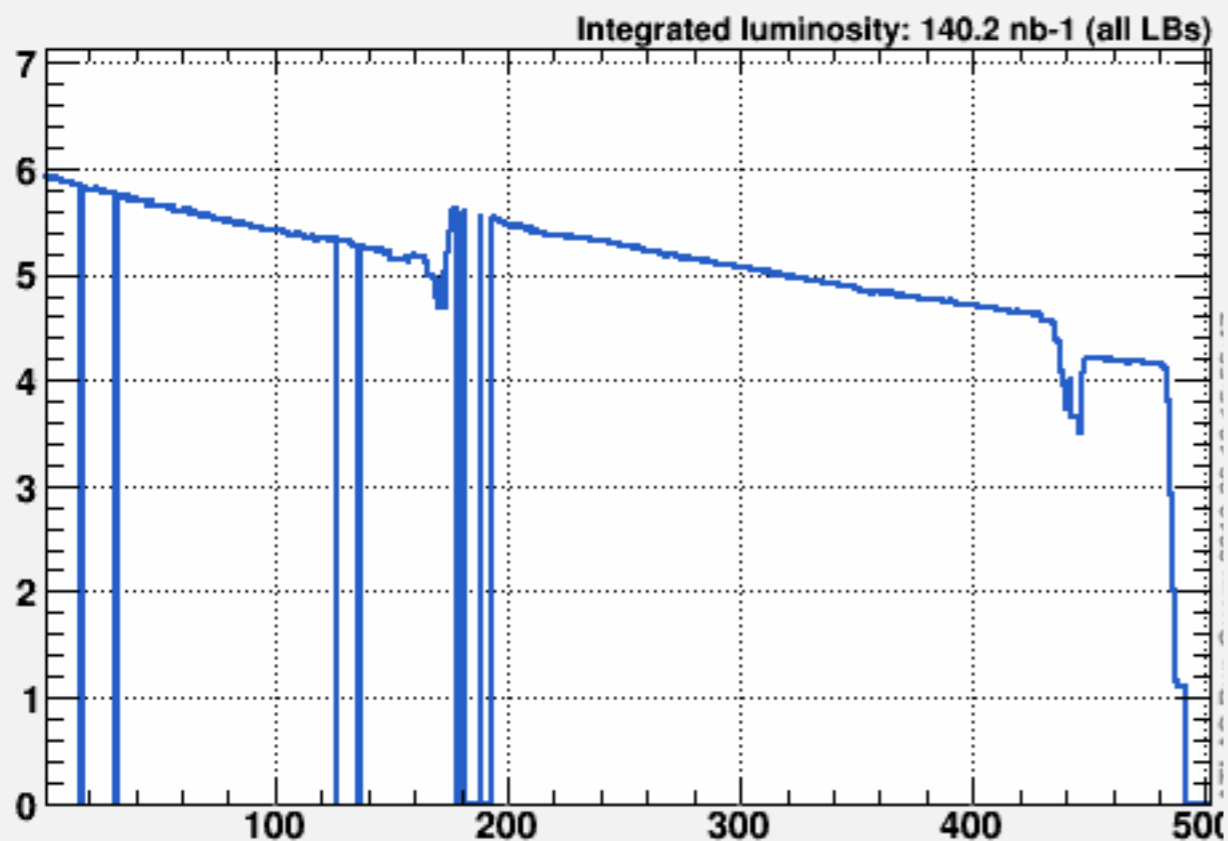


Nevýhoda

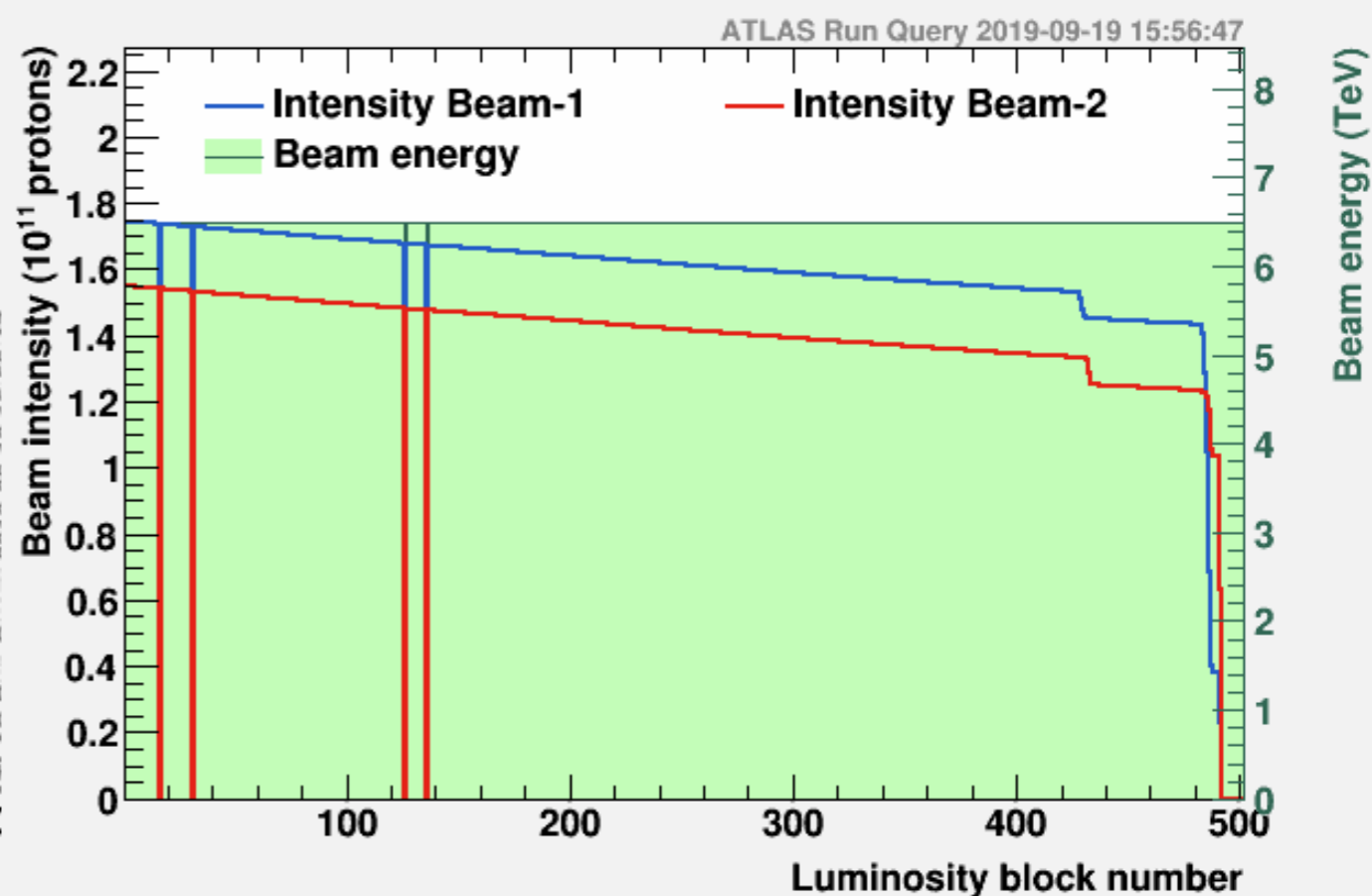
Víc ovlivněno pozadím

RUN 324195

Online lumi [ATLAS_PREFERRED] per LB for run 324195



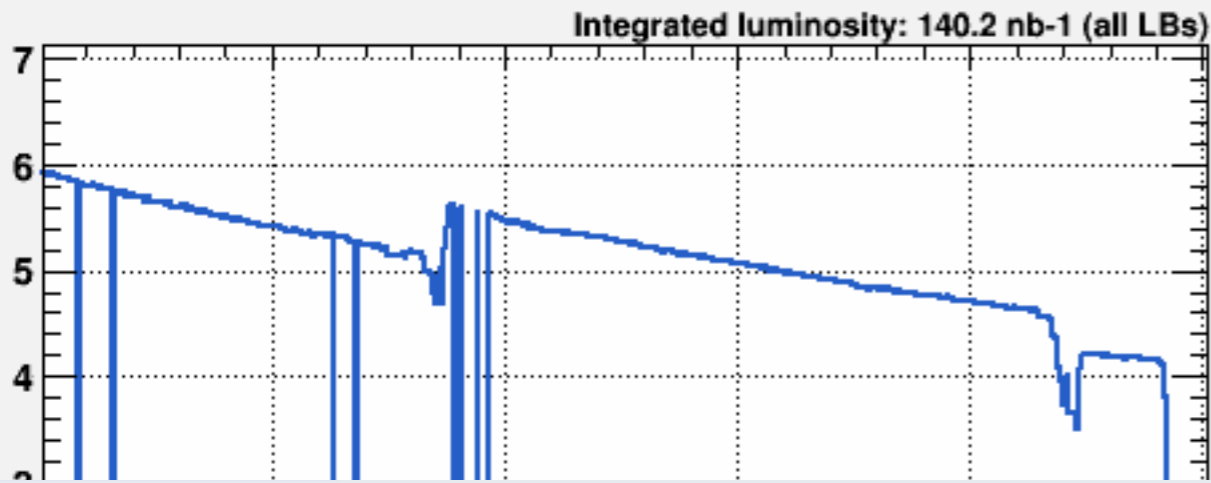
LHC summary vs. LB for run_324195



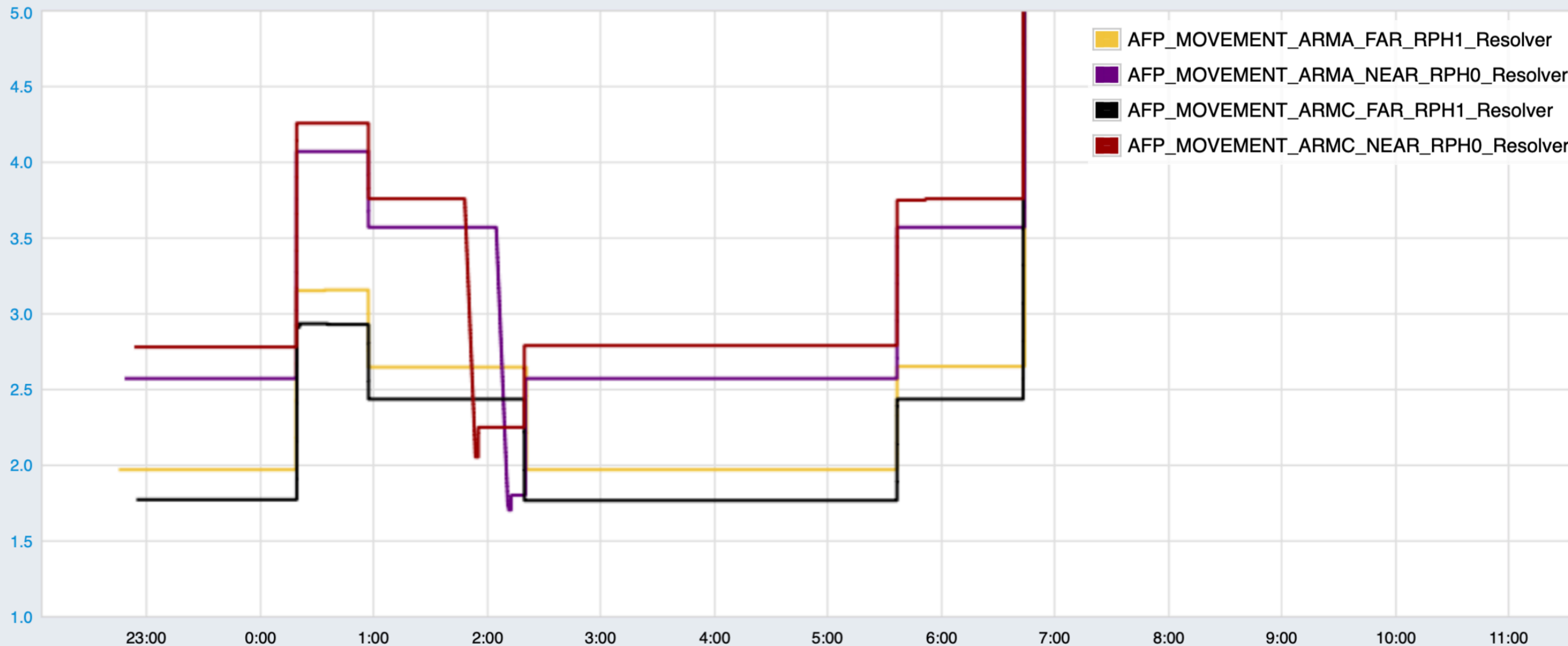
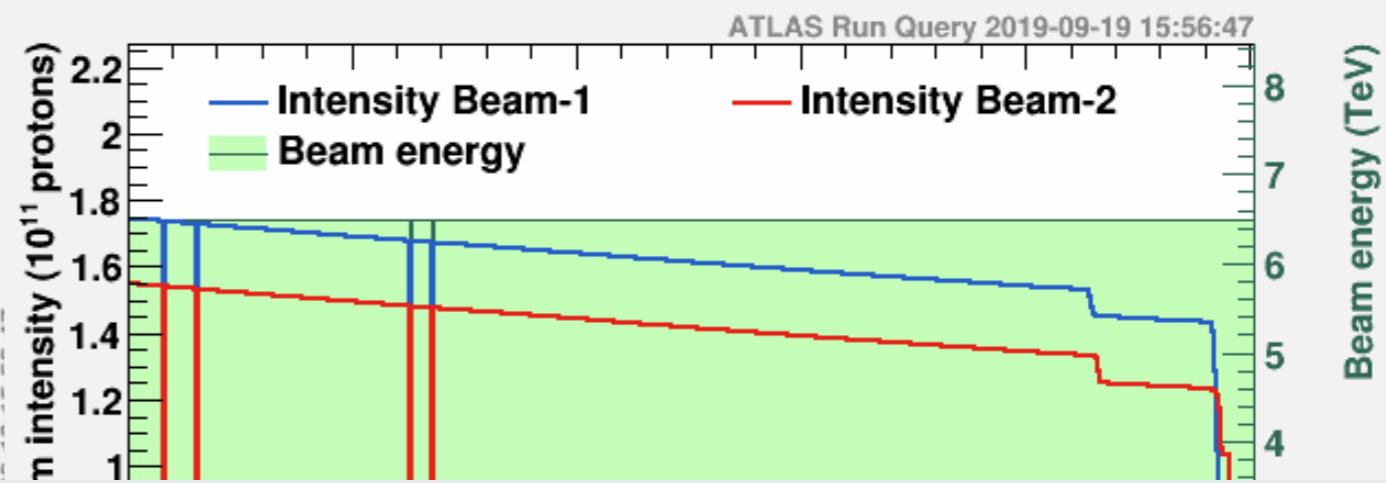
- specialní run (21/22 května 2017)
- Beam Based Alignment (BBA) test

RUN 324195

Online lumi [ATLAS_PREFERRED] per LB for run 324195

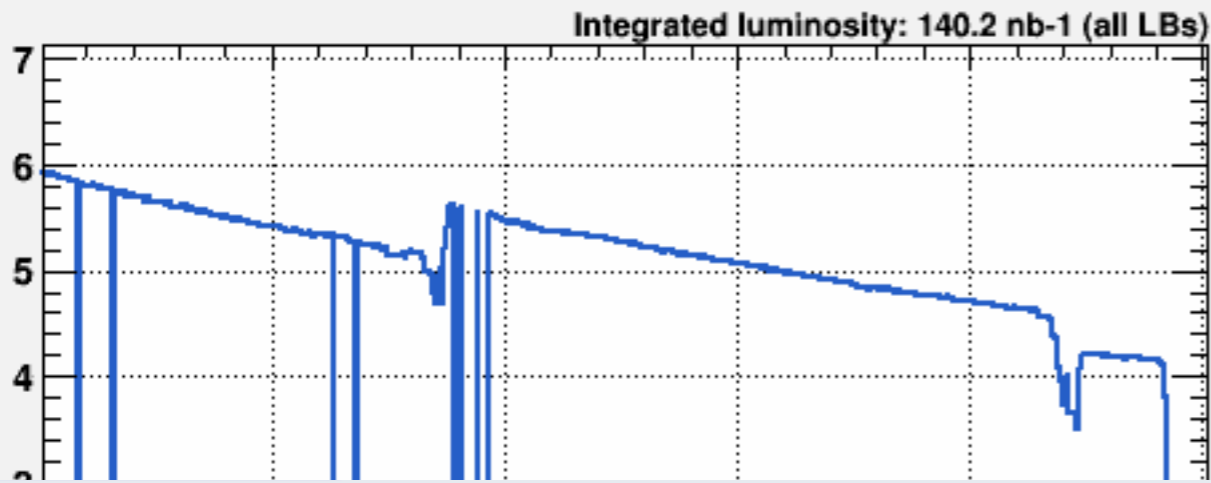


LHC summary vs. LB for run_324195

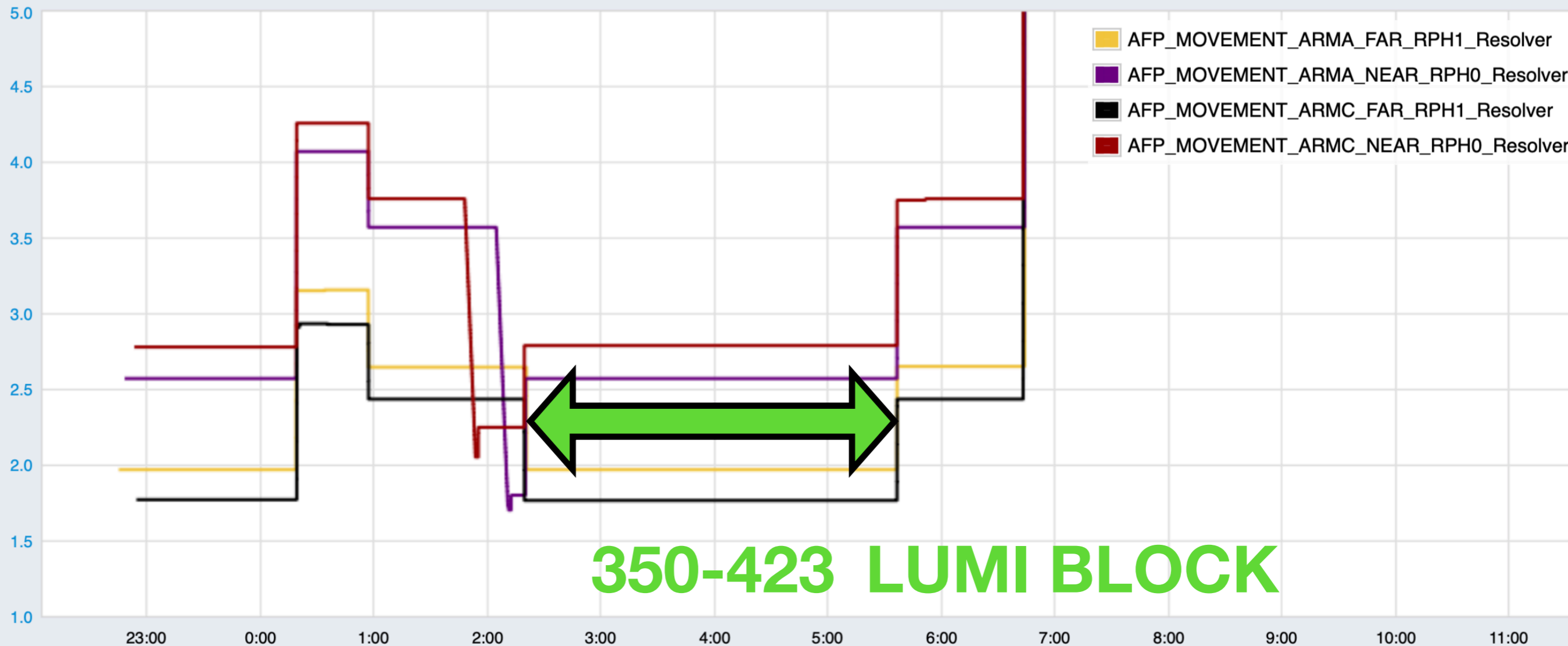
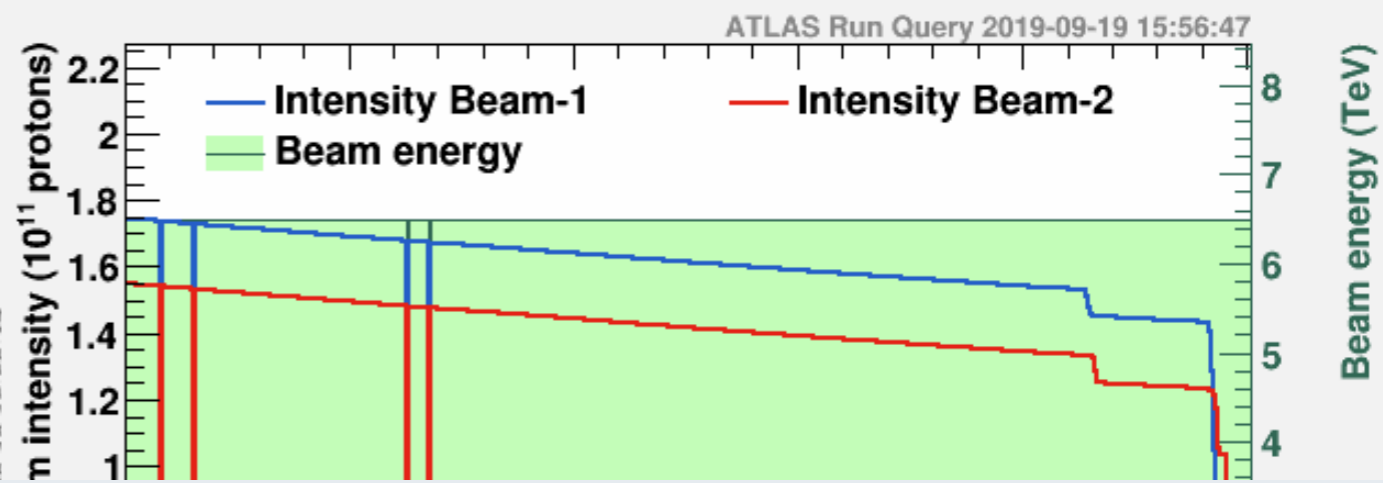


RUN 324195

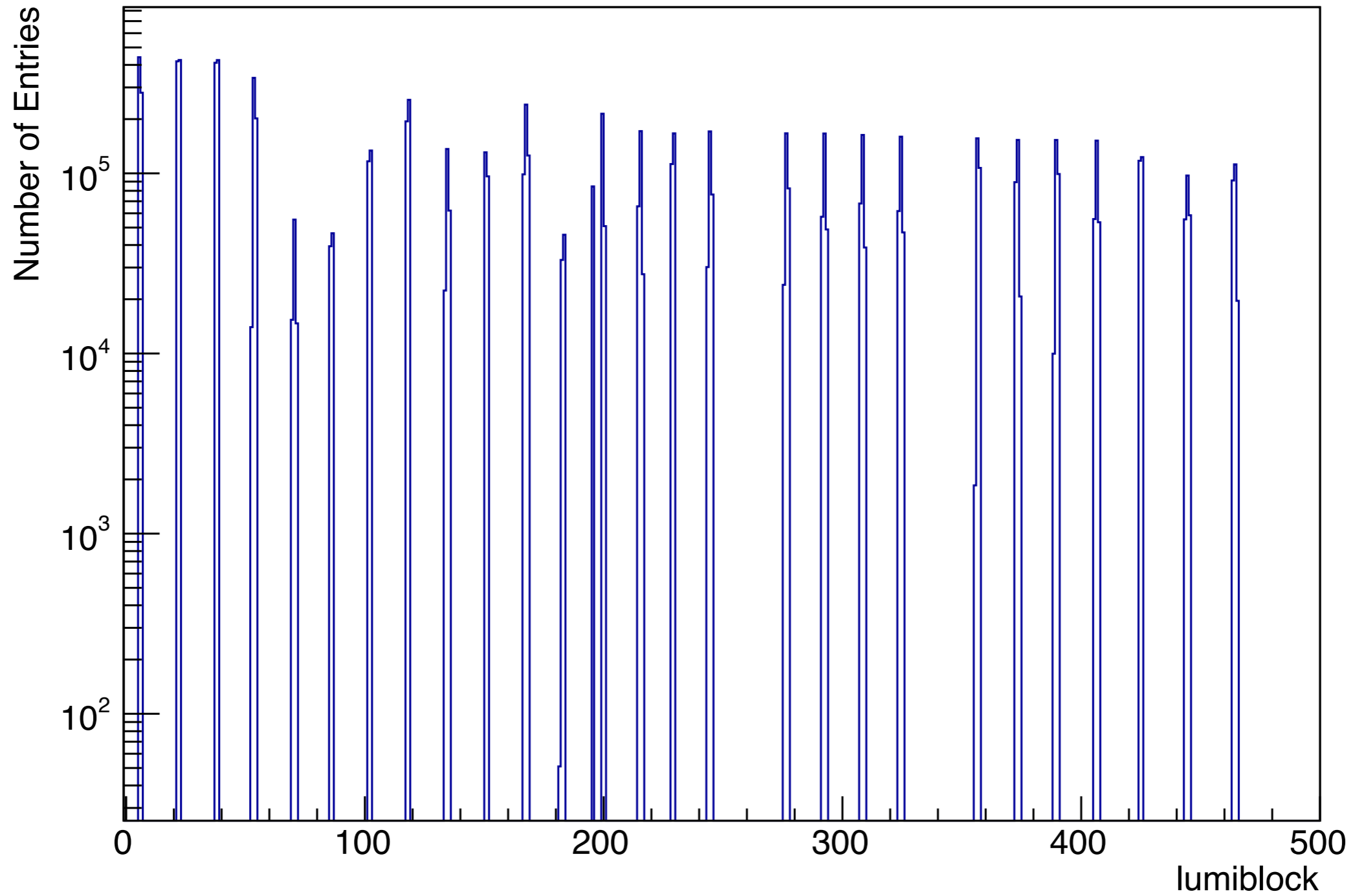
Online lumi [ATLAS_PREFERRED] per LB for run 324195



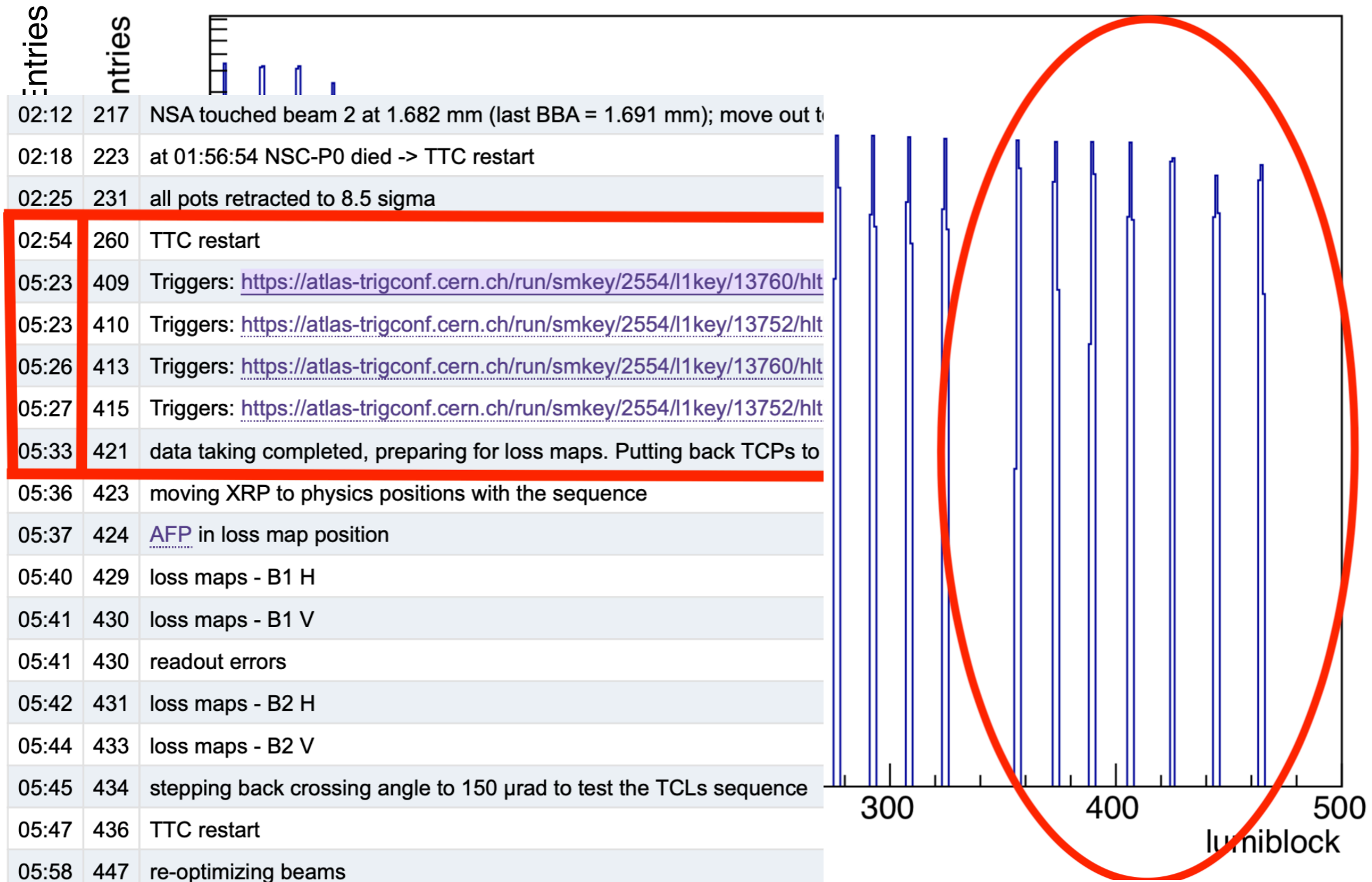
LHC summary vs. LB for run_324195



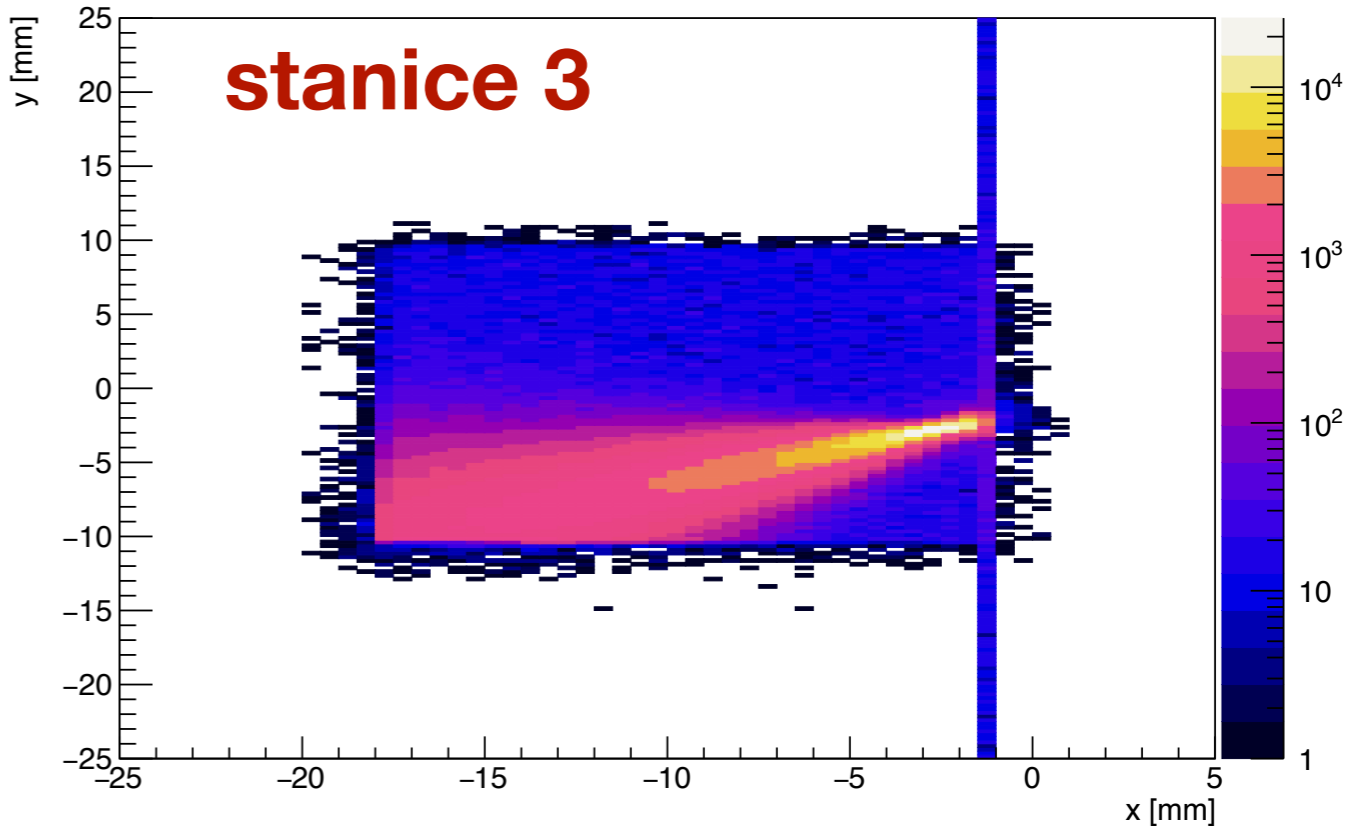
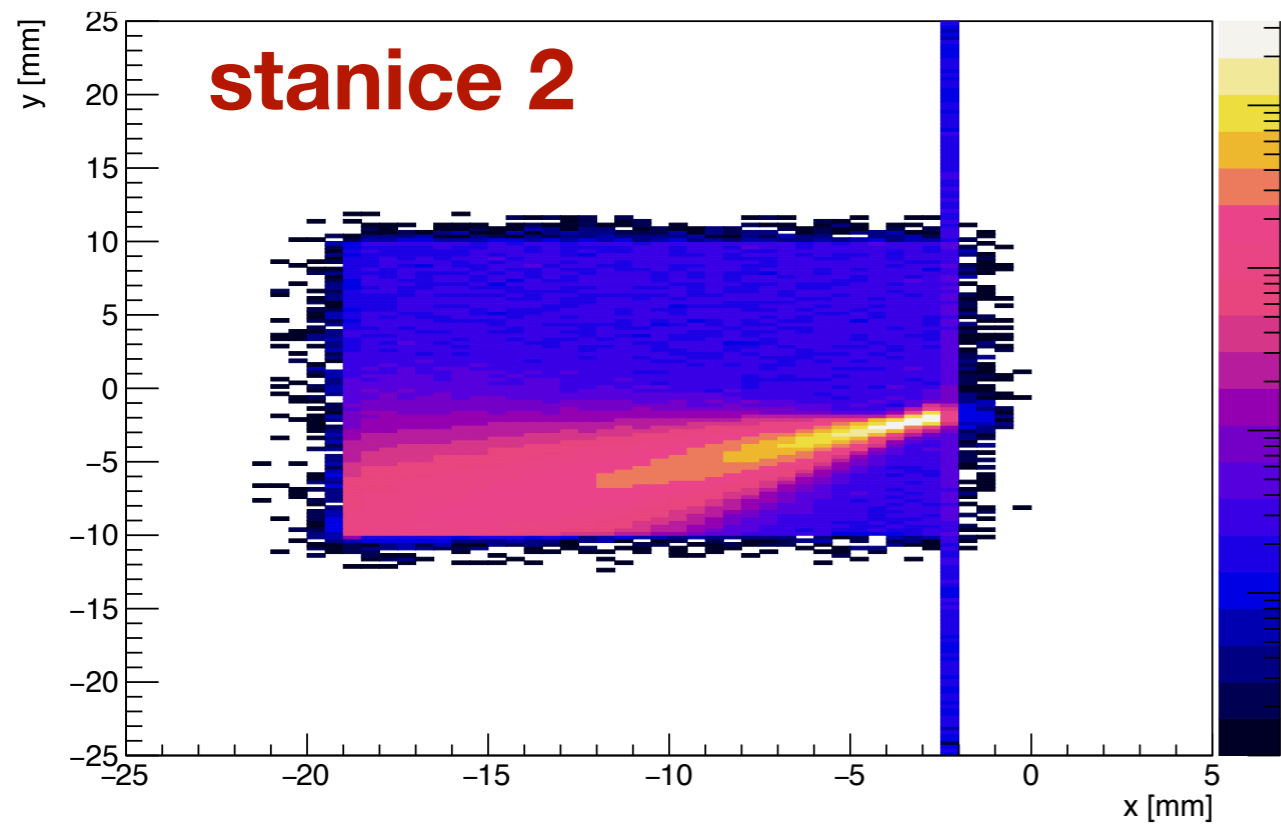
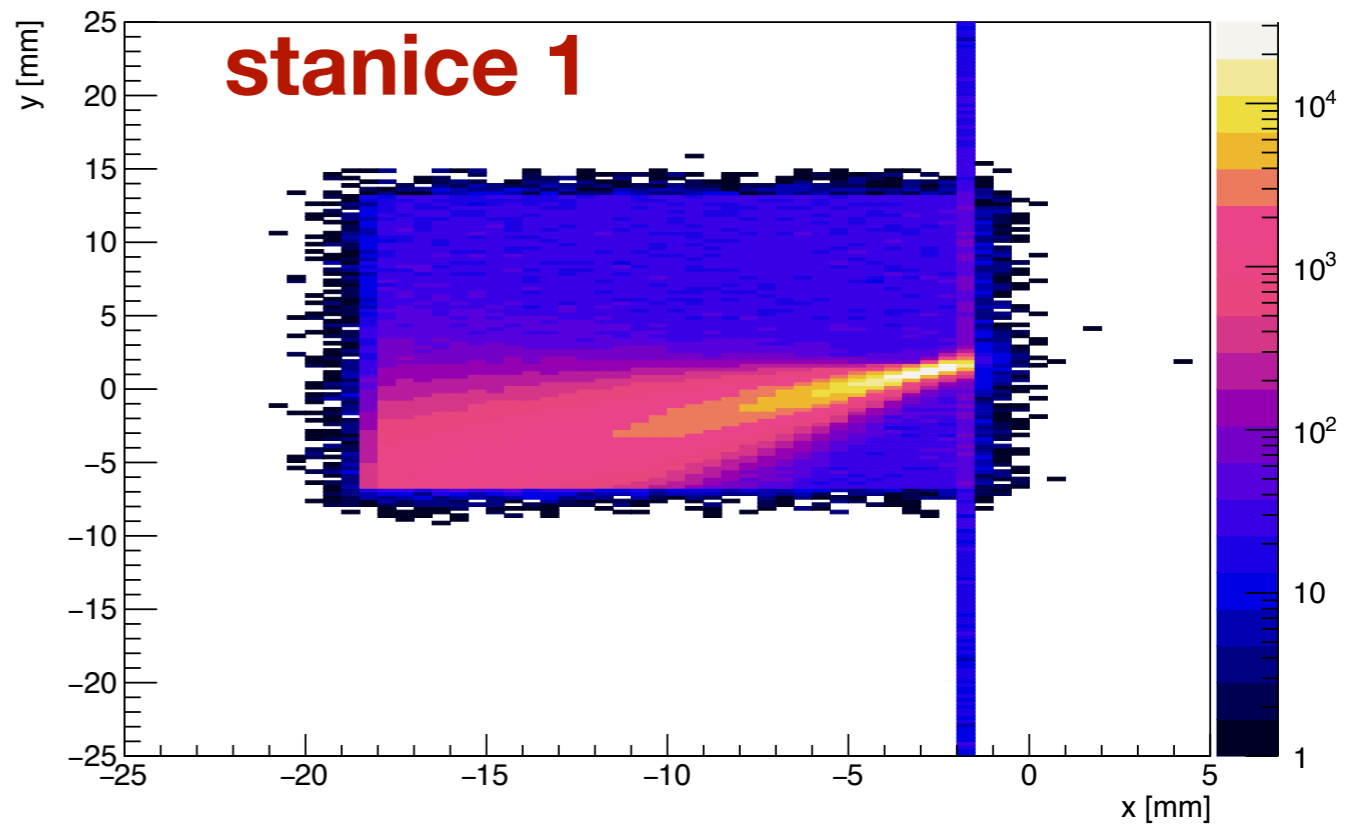
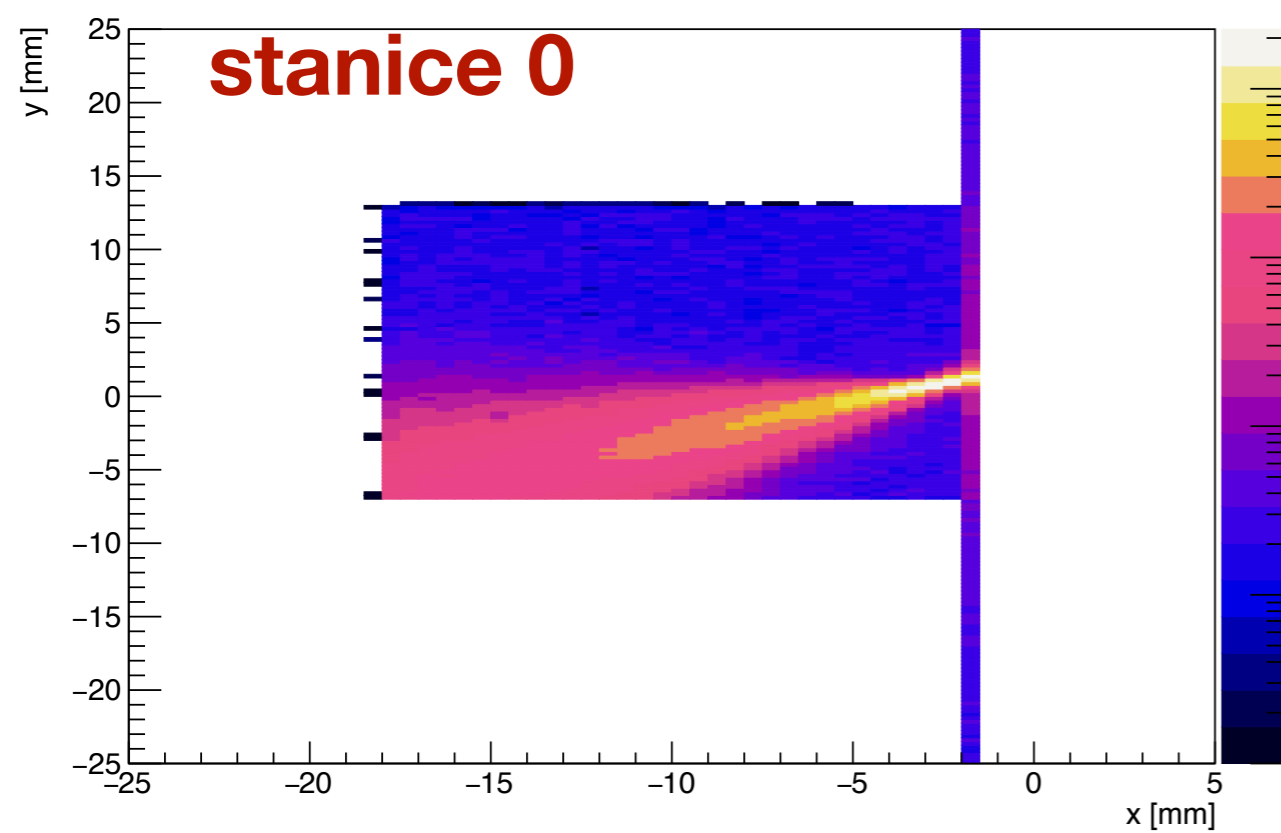
RUN 324195

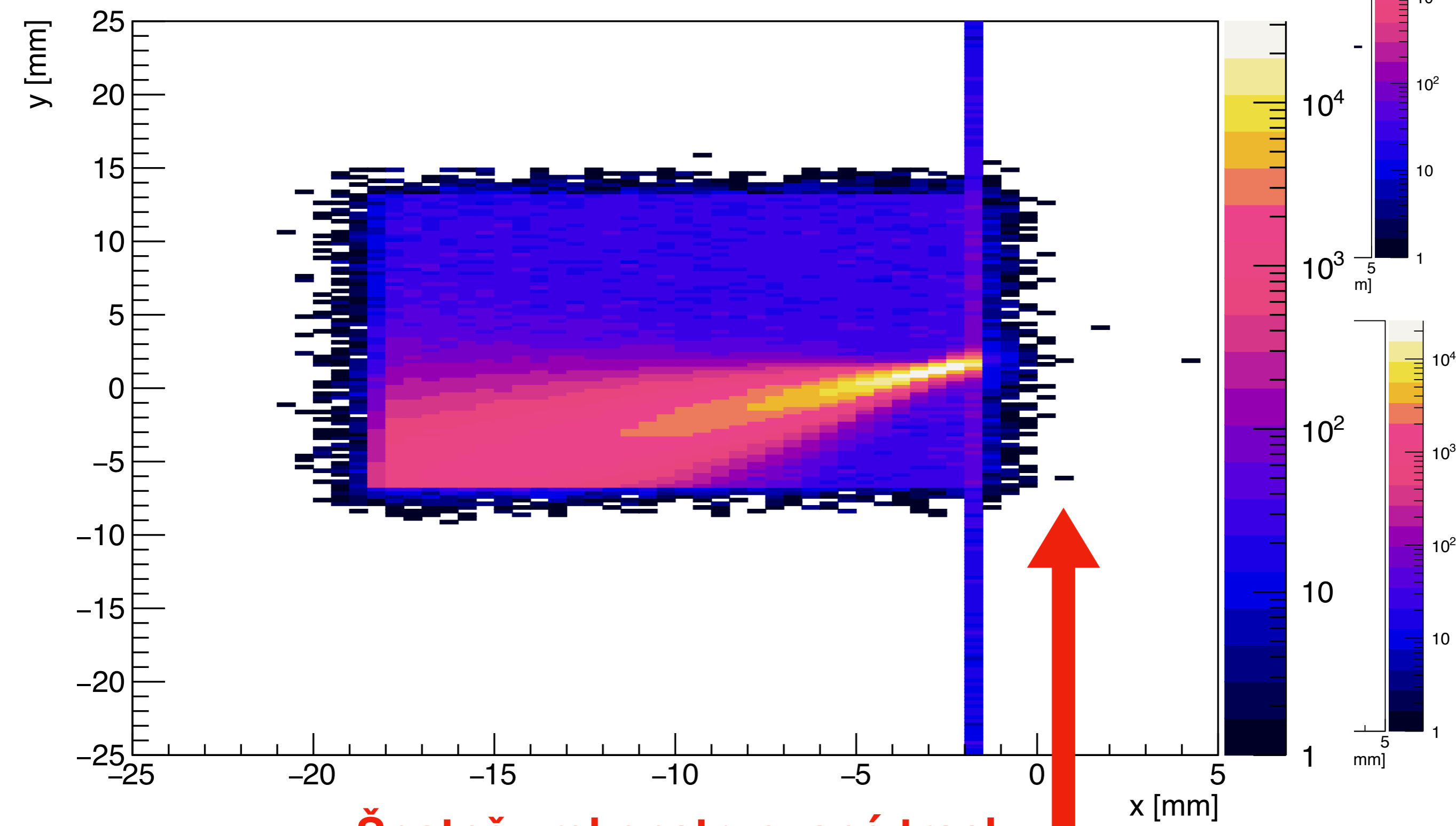
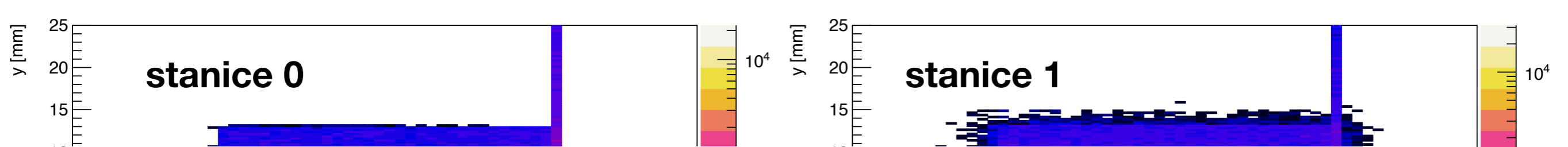


RUN 324195



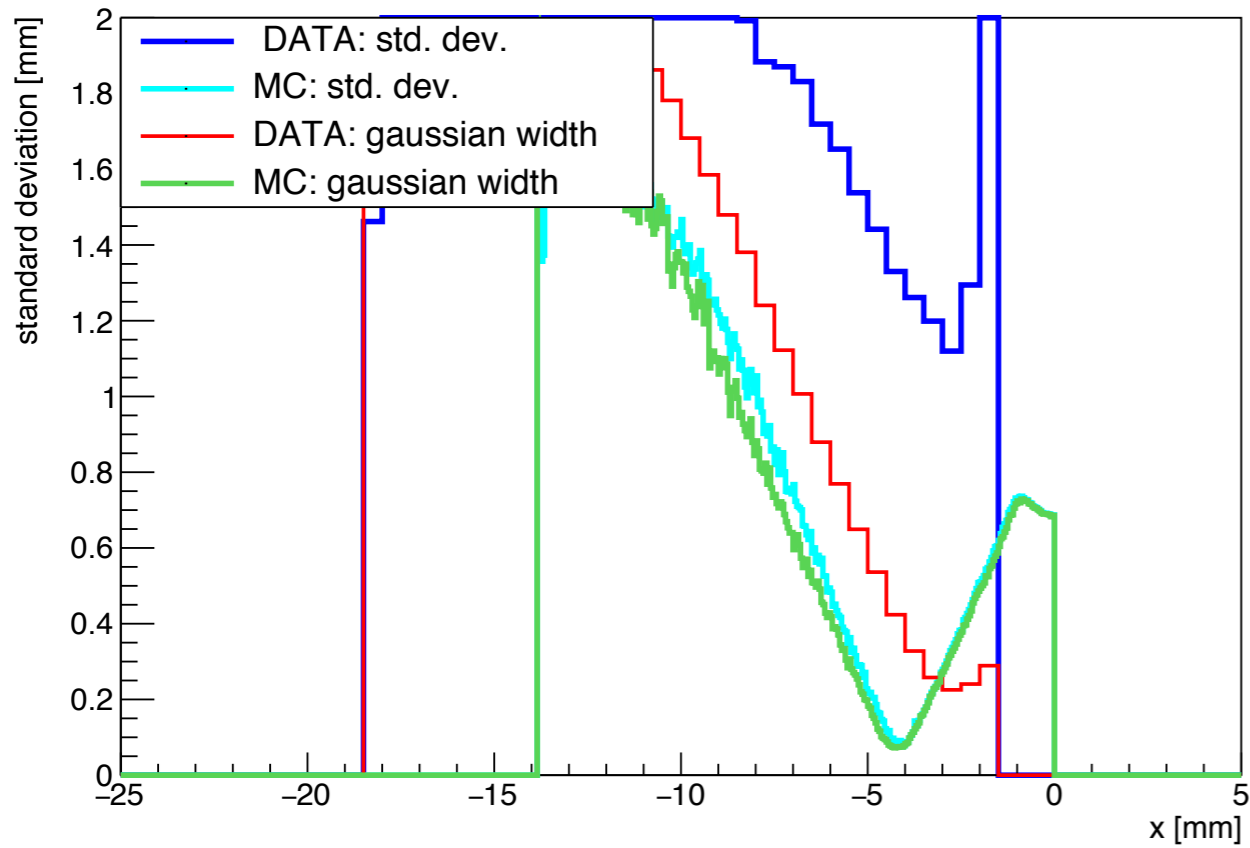
Data



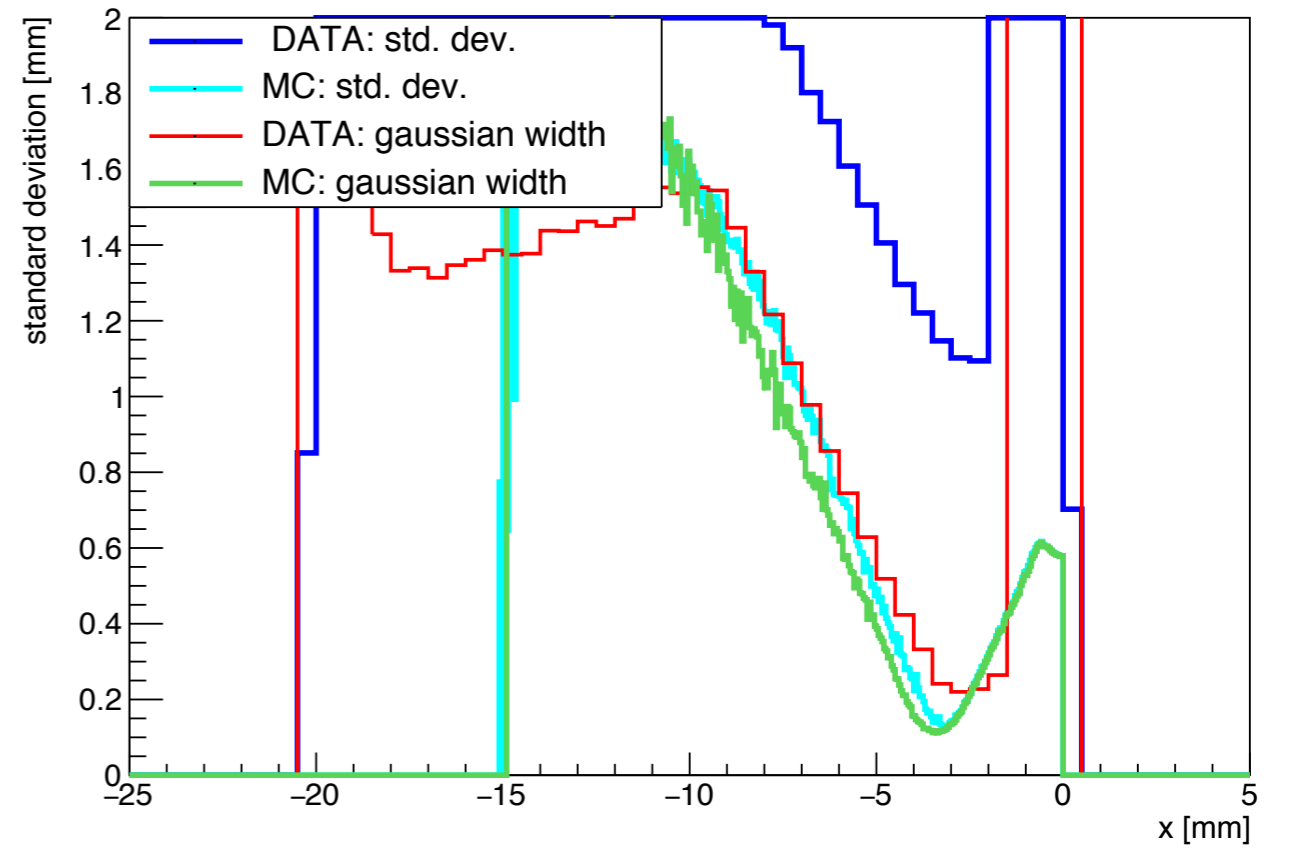


Špatně zrekonstruované tracky

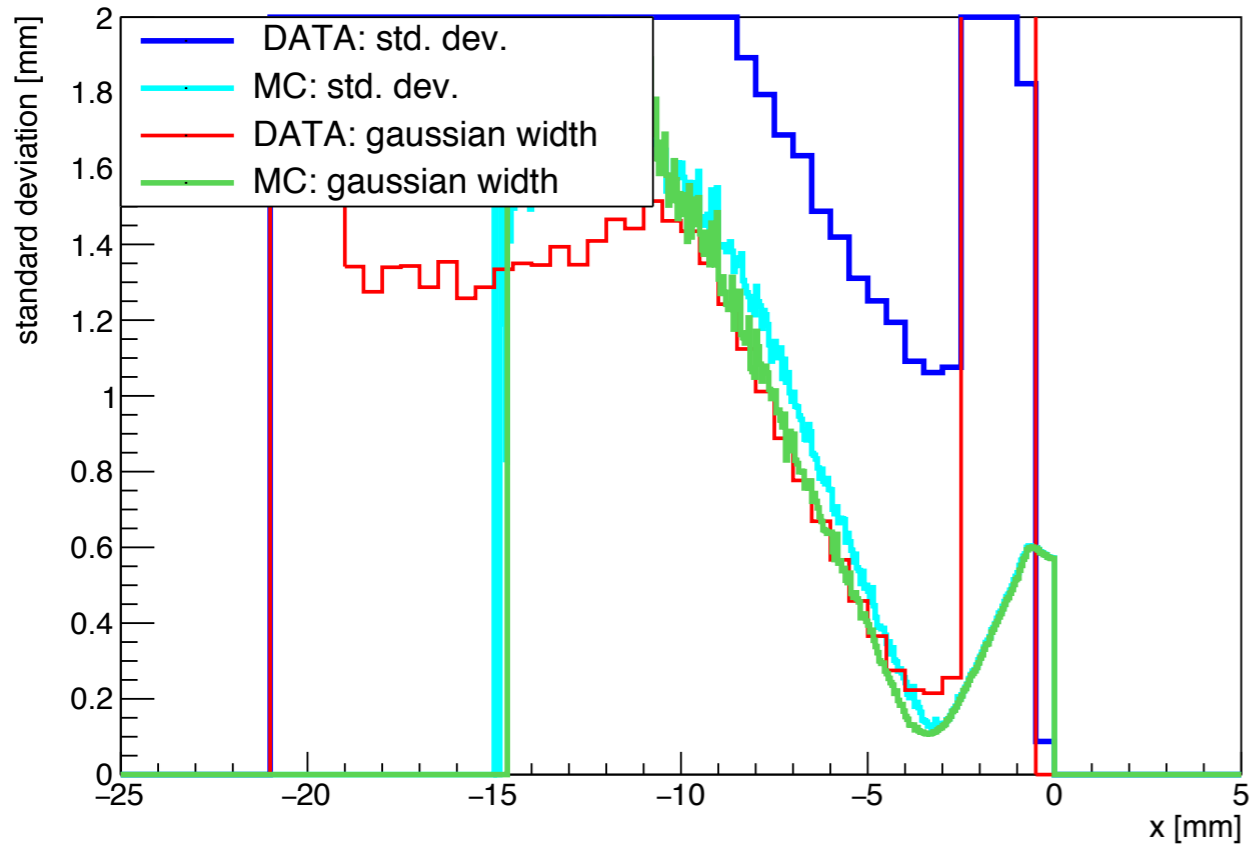
stanice 0



stanice 1



stanice 2



stanice 3

