AFP - ToF

ATLAS Forward Proton - Time of Flight detector

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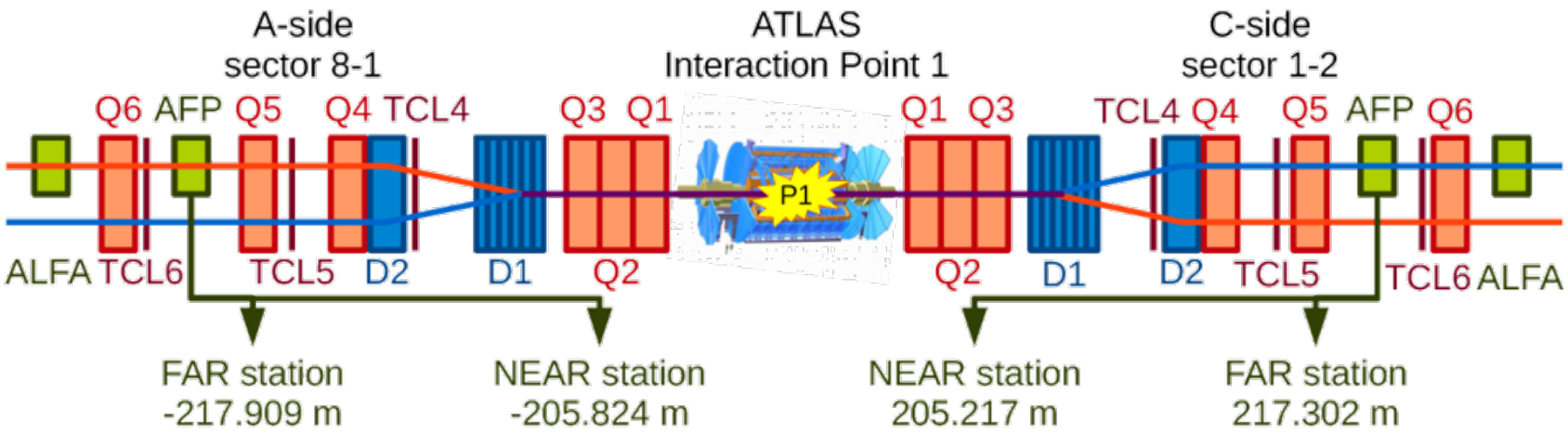
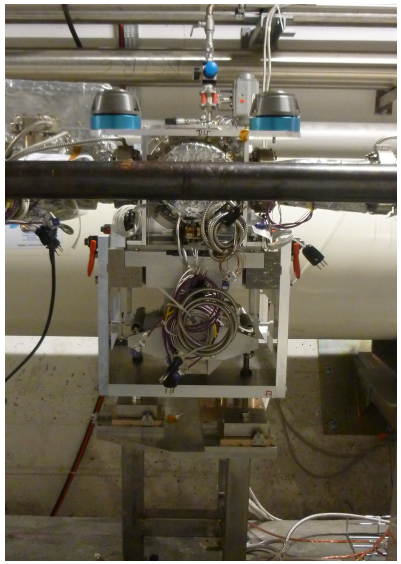
AFP



- the AFP is about 200 m away from the ATLAS Interaction Point (P1)

Why so far?

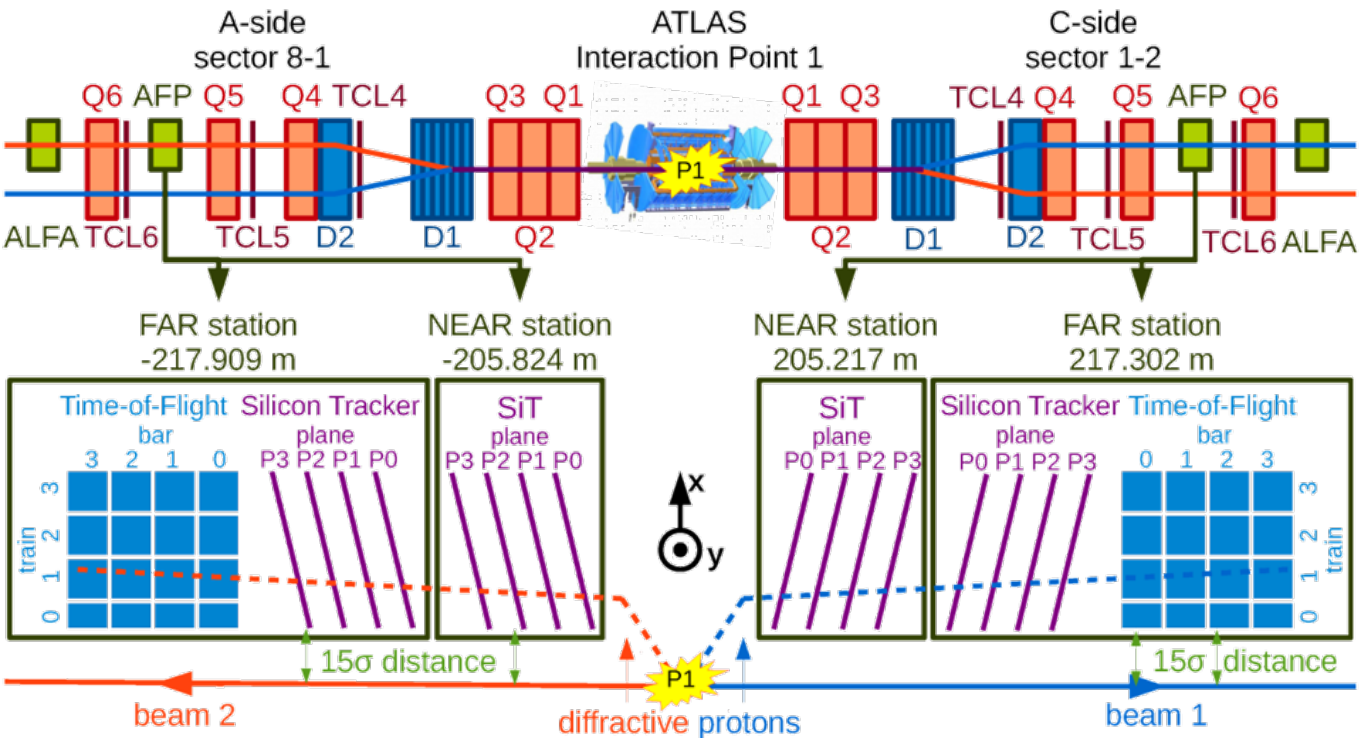


to measure diffractive processes
there the proton

- remain intact
- propagate in forward direction

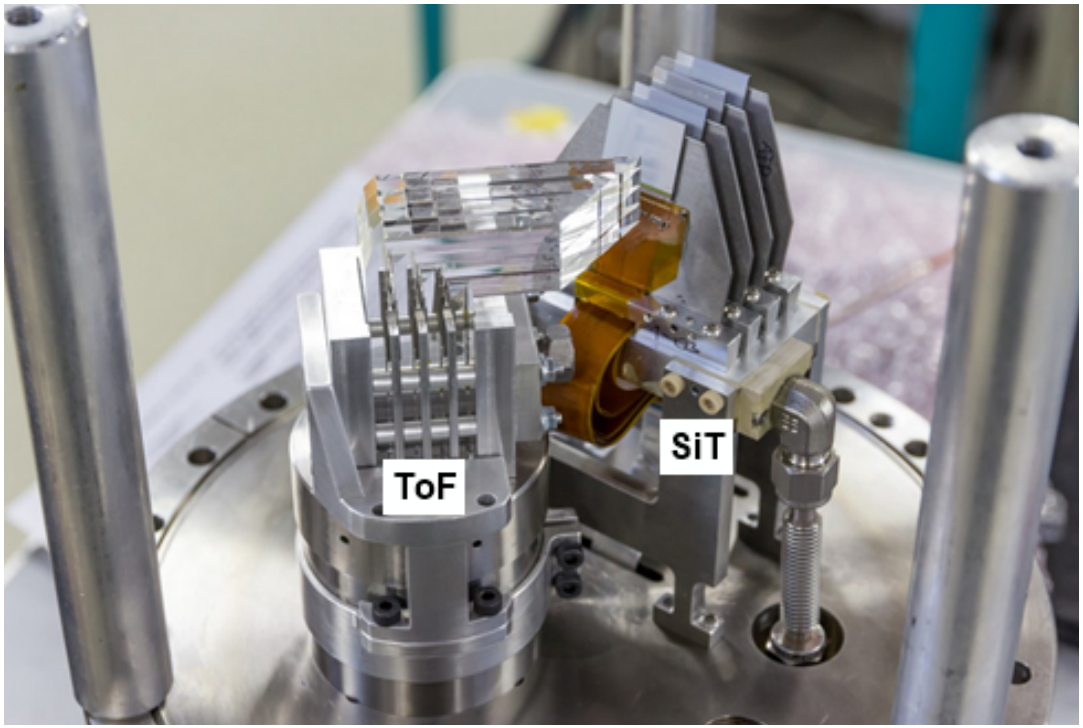
$\Rightarrow$ these protons can be detected by the AFP
for this they have to be separated from the beams (1 & 2)

AFP



- ToF consists of 16 bars
- charged relativistic particles generate Cherenkov light

ToF



$\Rightarrow$ to distinguish the events in pile-up

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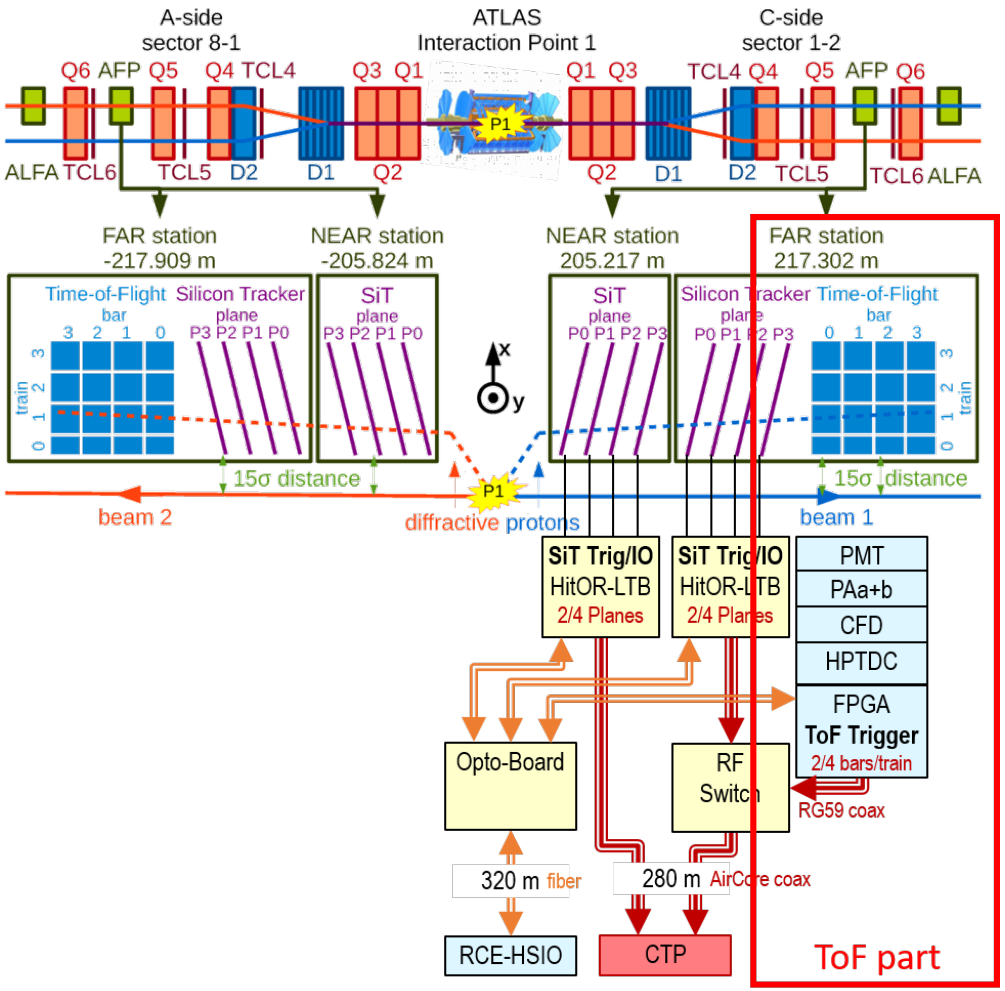
https://arxiv.org/abs/2010.00237
https://indico.cern.ch/event/861104/contributions/4503087/

ToF - electronics



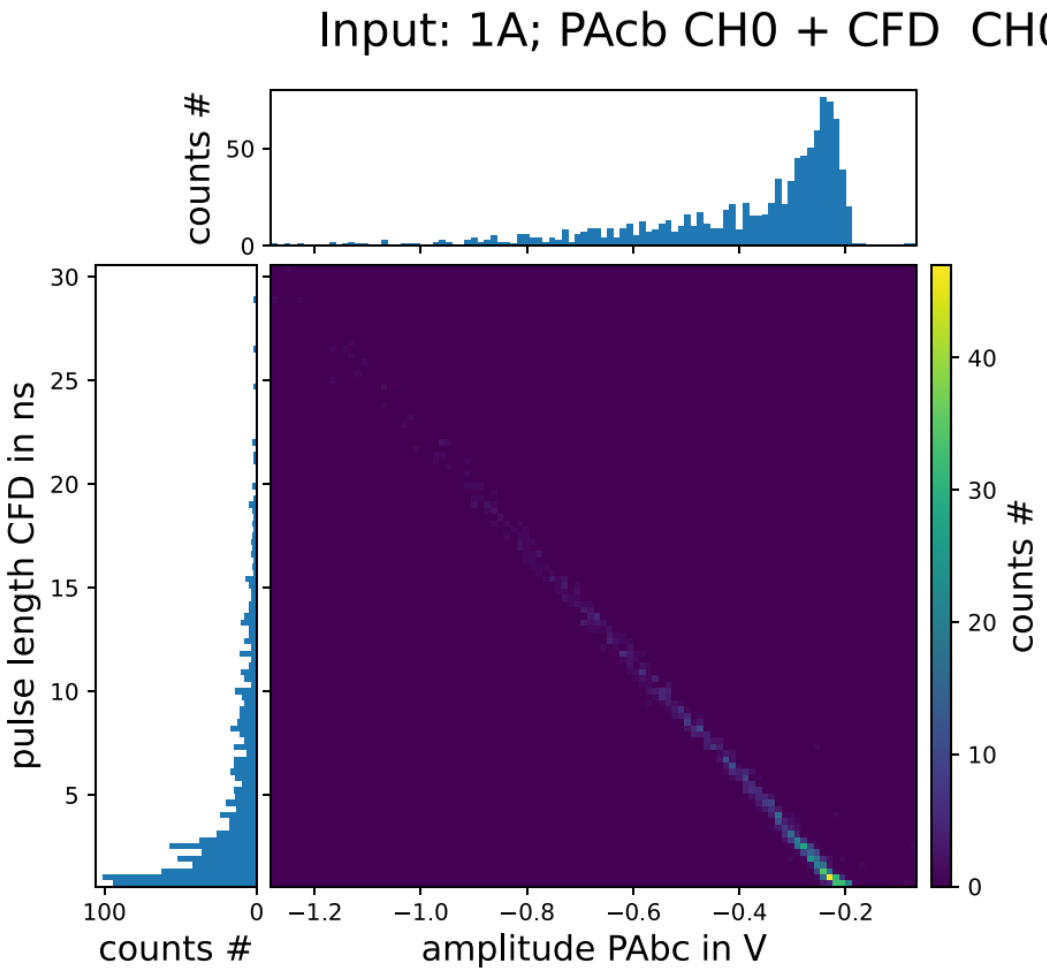
PMT - Photomultiplier

PAa+b - Preamplifiers

CFD - Constant Fraction Discriminator

HPTDC - High Performance Time to Digital Converter

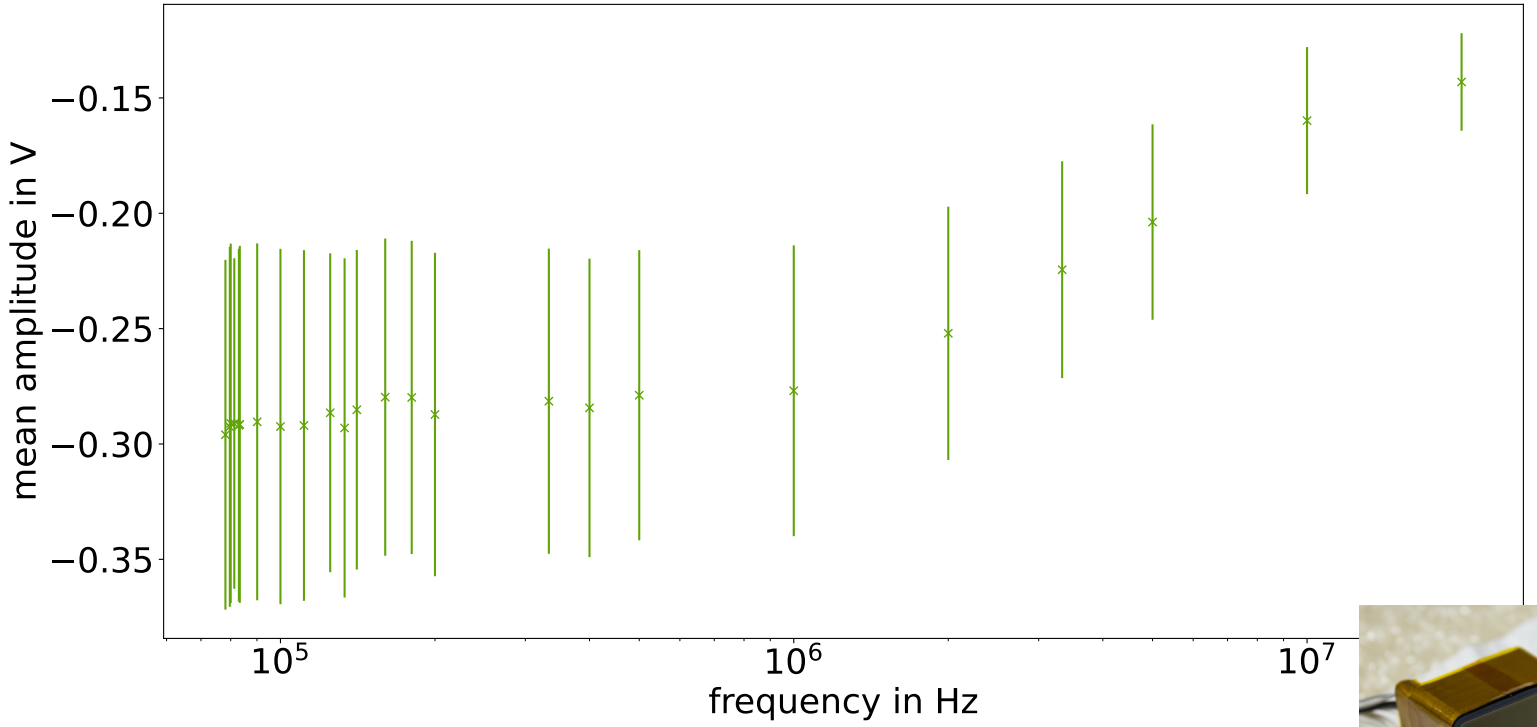
CFD - Constant Fraction Discriminator



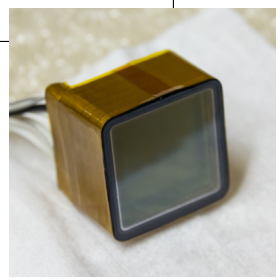
$\Rightarrow$ clearly linear dependency as configured to reconstruct the amplitude,

amplitude $\approx$
$\alpha \cdot$ pulse length $+ \beta$

MCP-PMT gain dependency on signal frequency

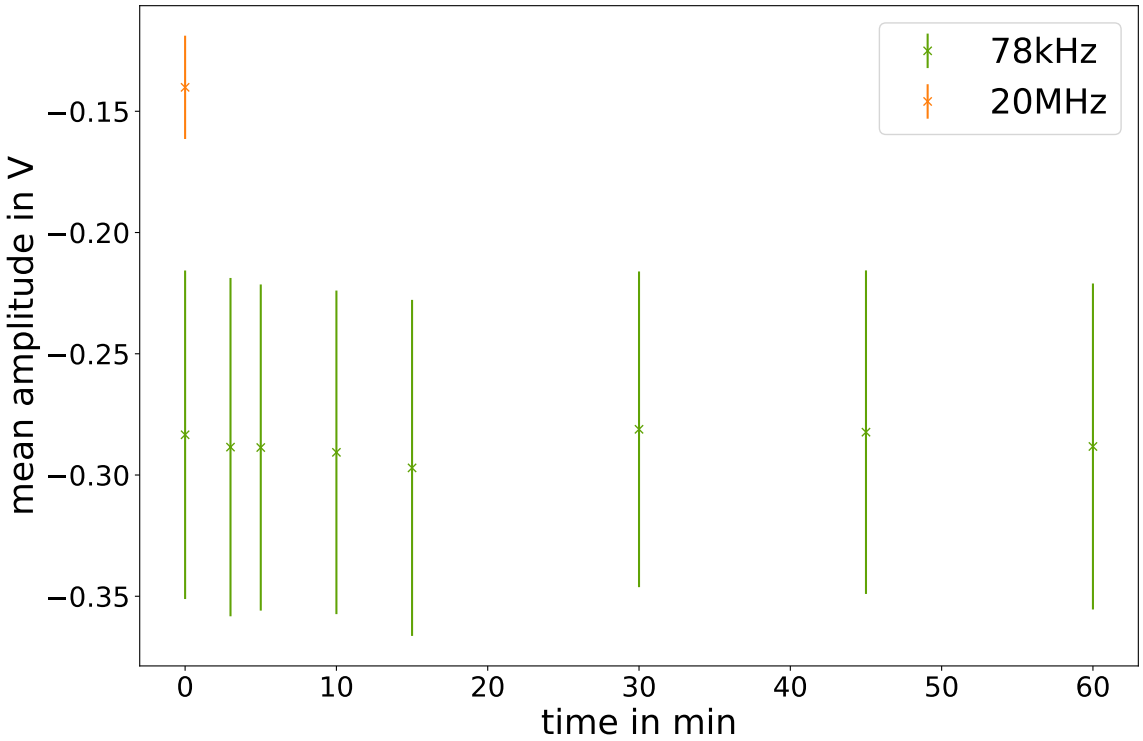


$\Rightarrow$ amplitude decreases after 100 kHz



MCP-PMT

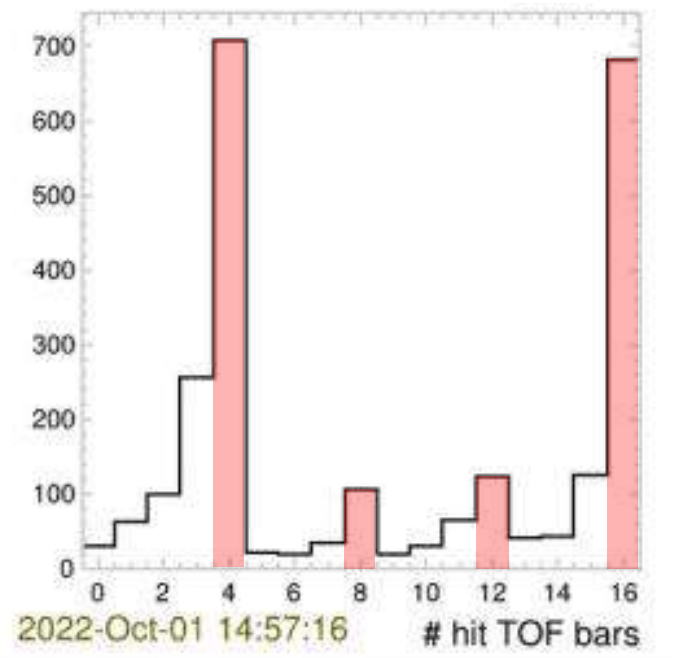
Recovery time of the MCP



$\Rightarrow$ no long recovery time, very different from a standard ALD MCP

future measurements

1) data loss
   - by triggering 4/4 in each train we see multiplicities other than 4,8,12,16 which we aspect (red)



2) first step: check saturation of TDC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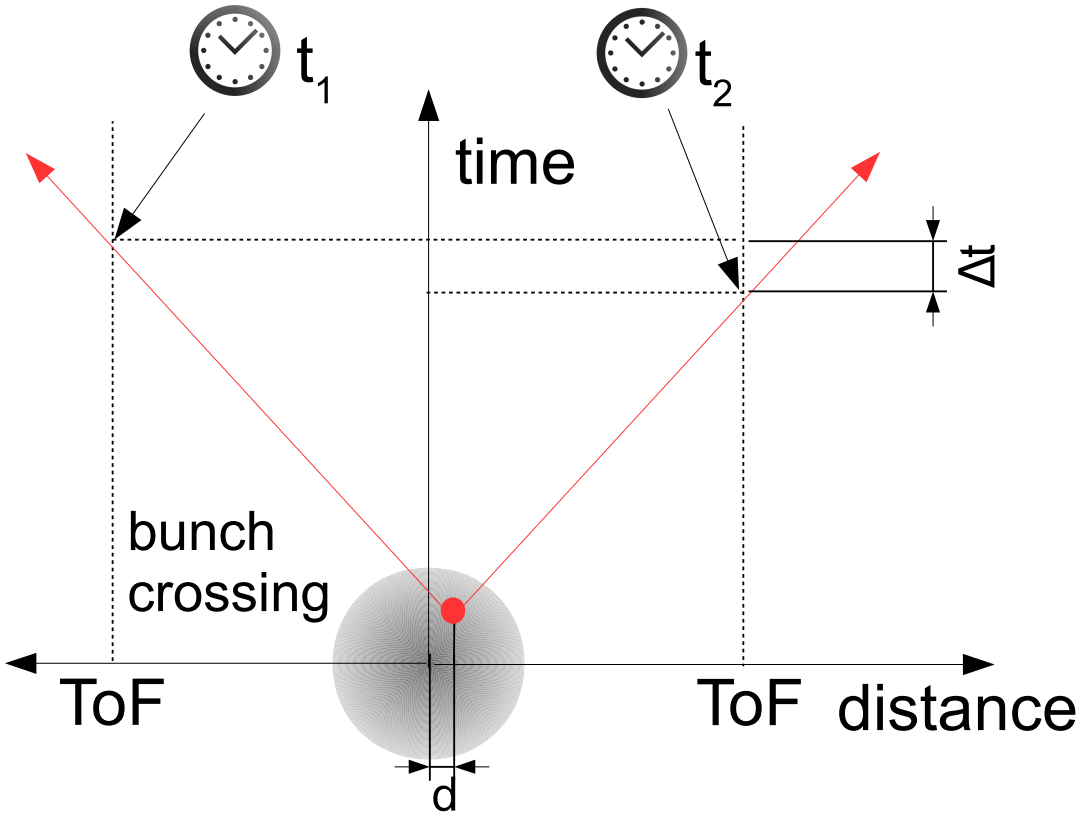
time measurement



$$d = \frac{c}{2}\Delta t$$