

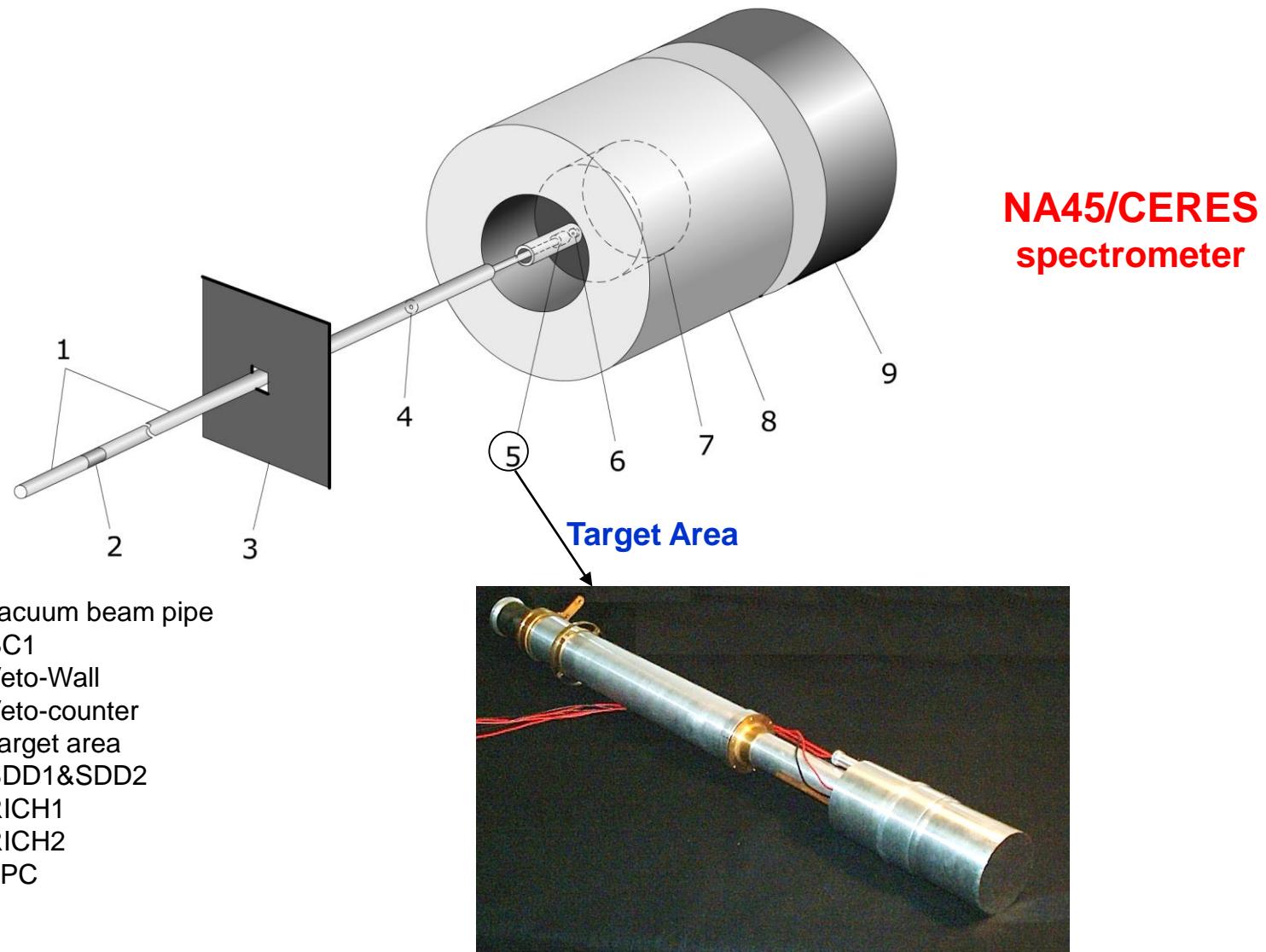
Fast Interaction Trigger of BM@N

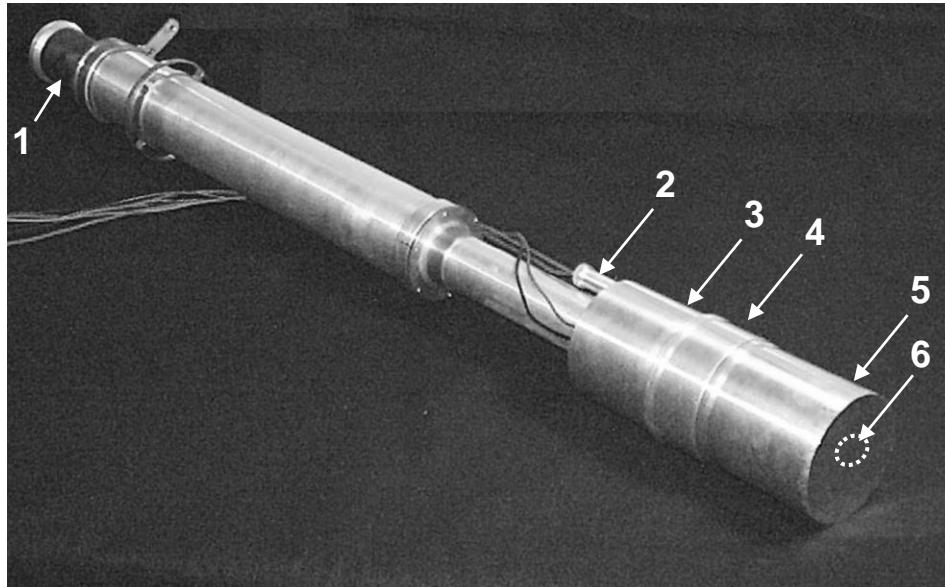
Project

Vladimir Yurevich

Experience of Fast Interaction Trigger development for Pb + Au collisions

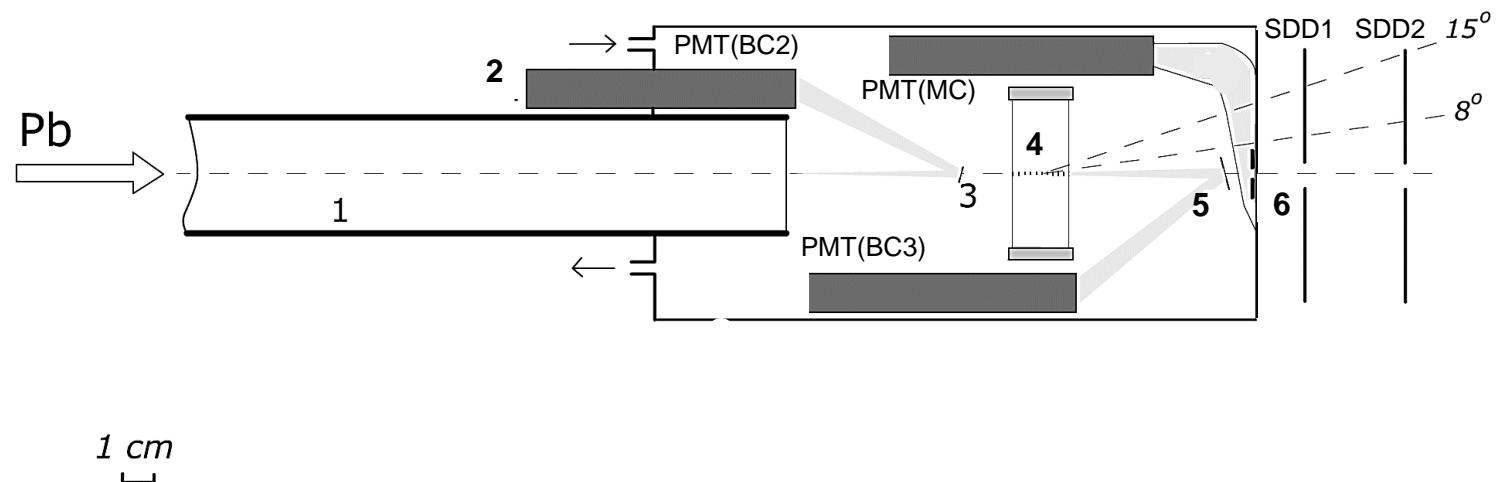
NA45





Target Area

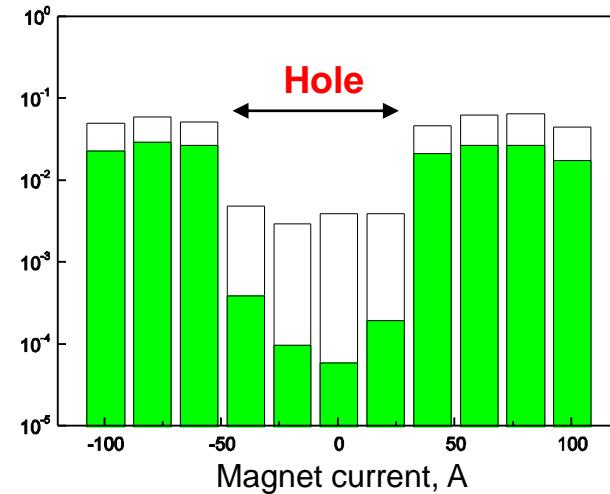
- 1 – carbon vacuum pipe
- 2 – PMT housing (BC2)
- 3 – BC2 (mirror)
- 4 – Au target
- 5 – BC3 (mirror)
- 6 – MC scintillator



Beam focusing on the target

Pb target with 1-mm hole

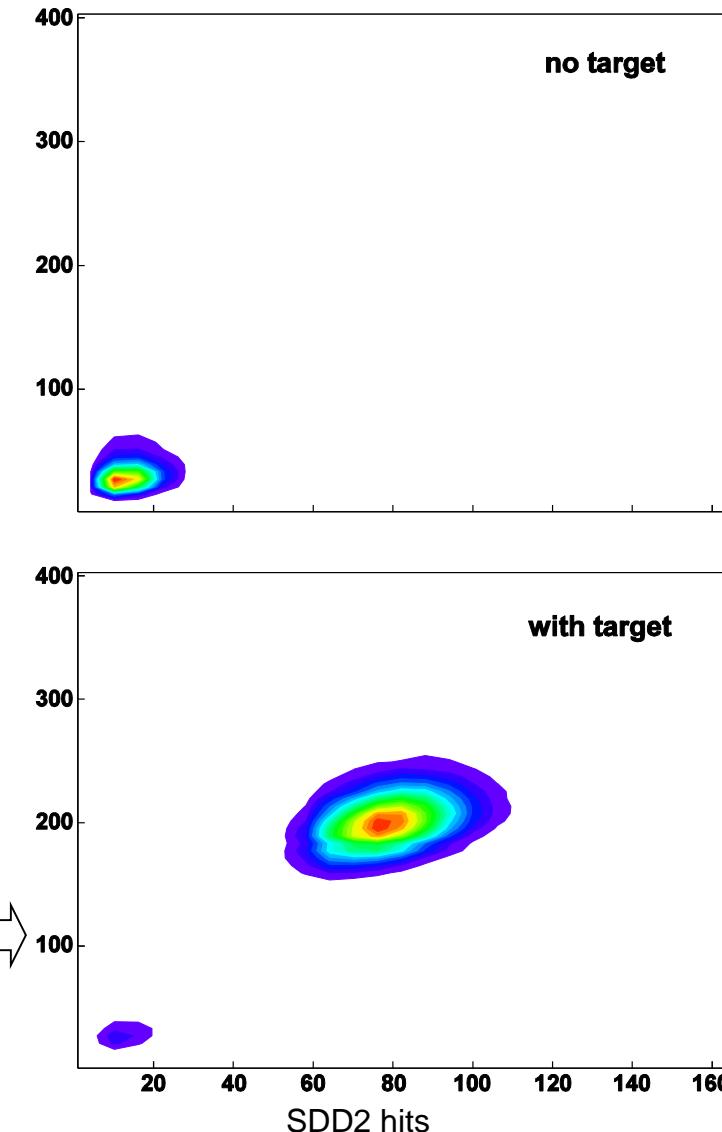
Trigger/BC1



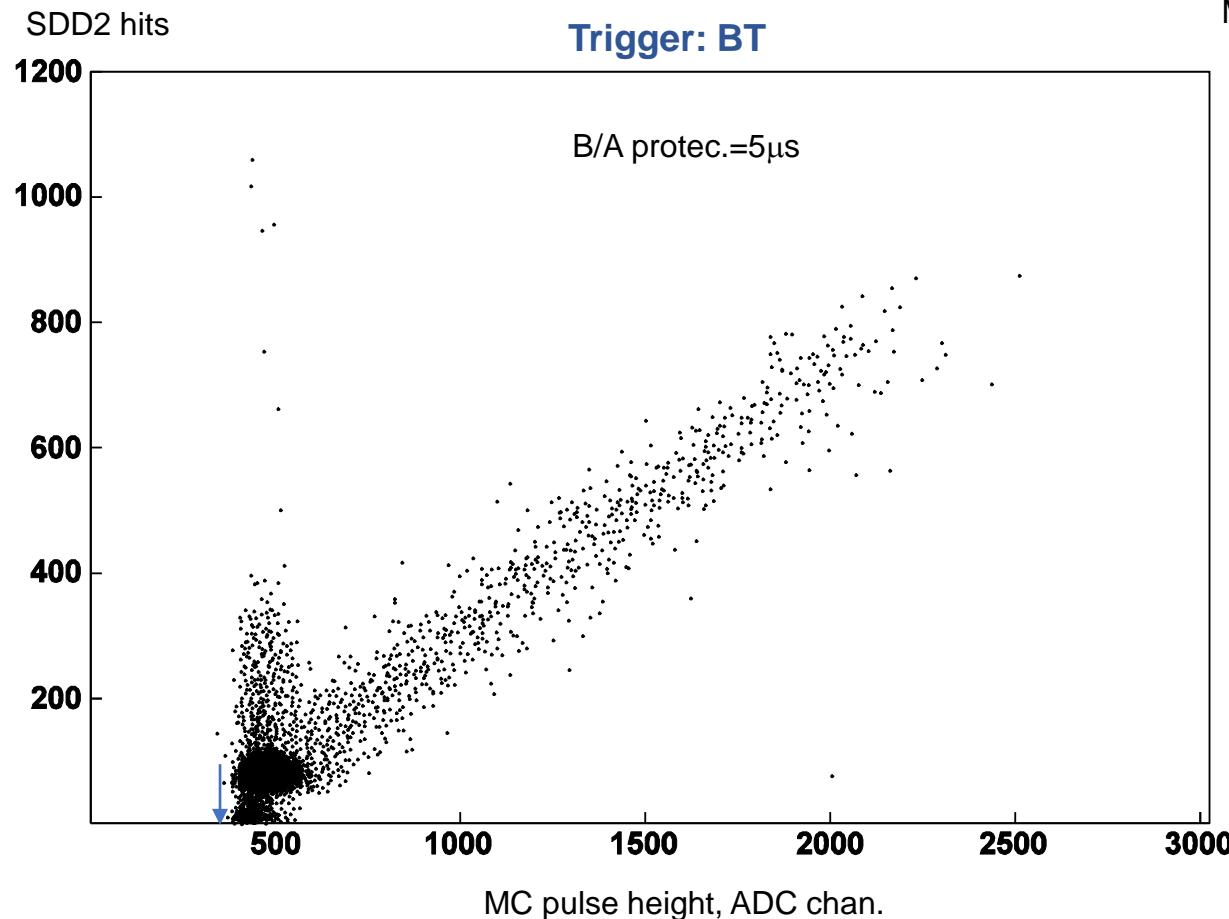
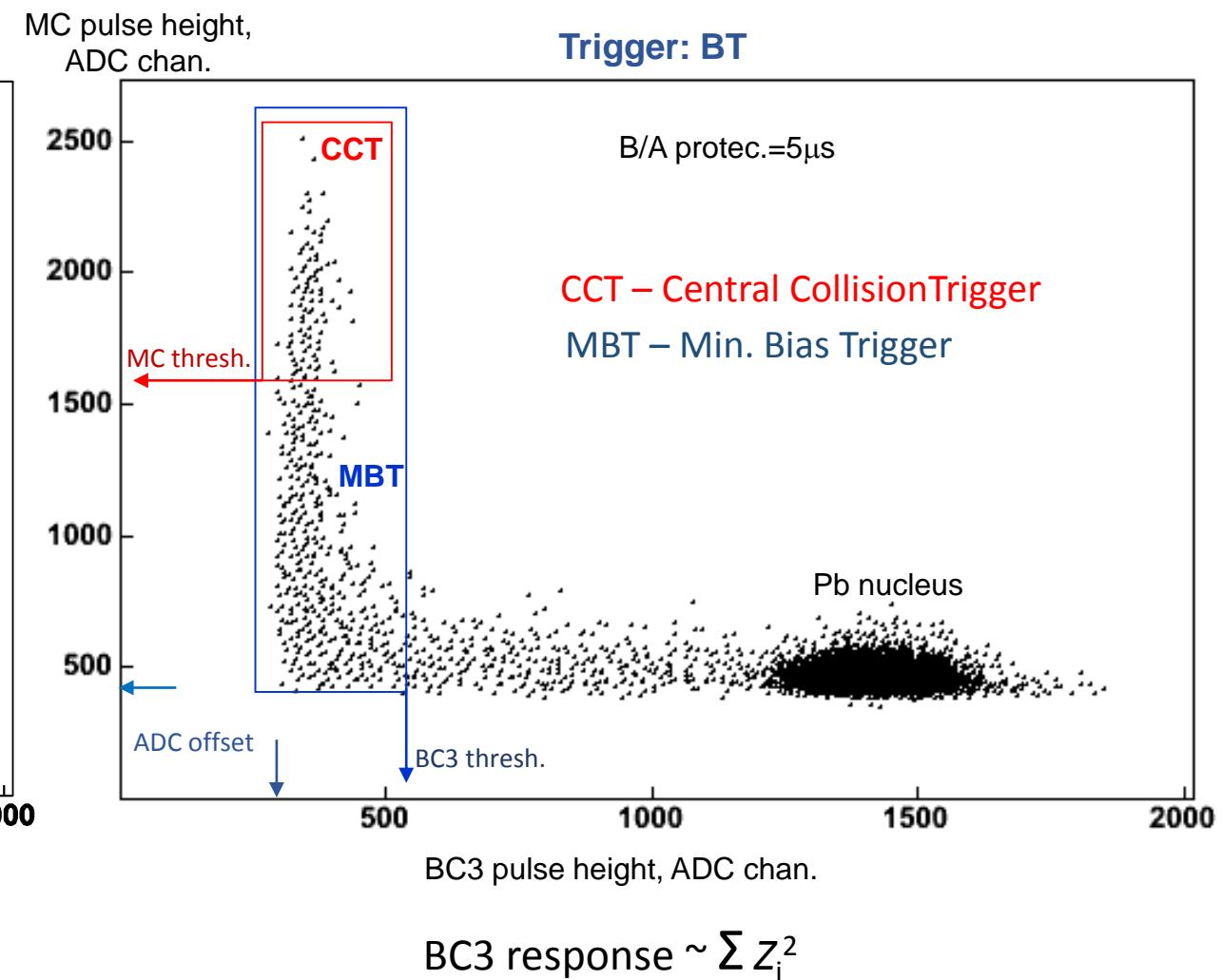
Triggers: MBT, CCT

Trigger: BT
B/A protec.=5μS

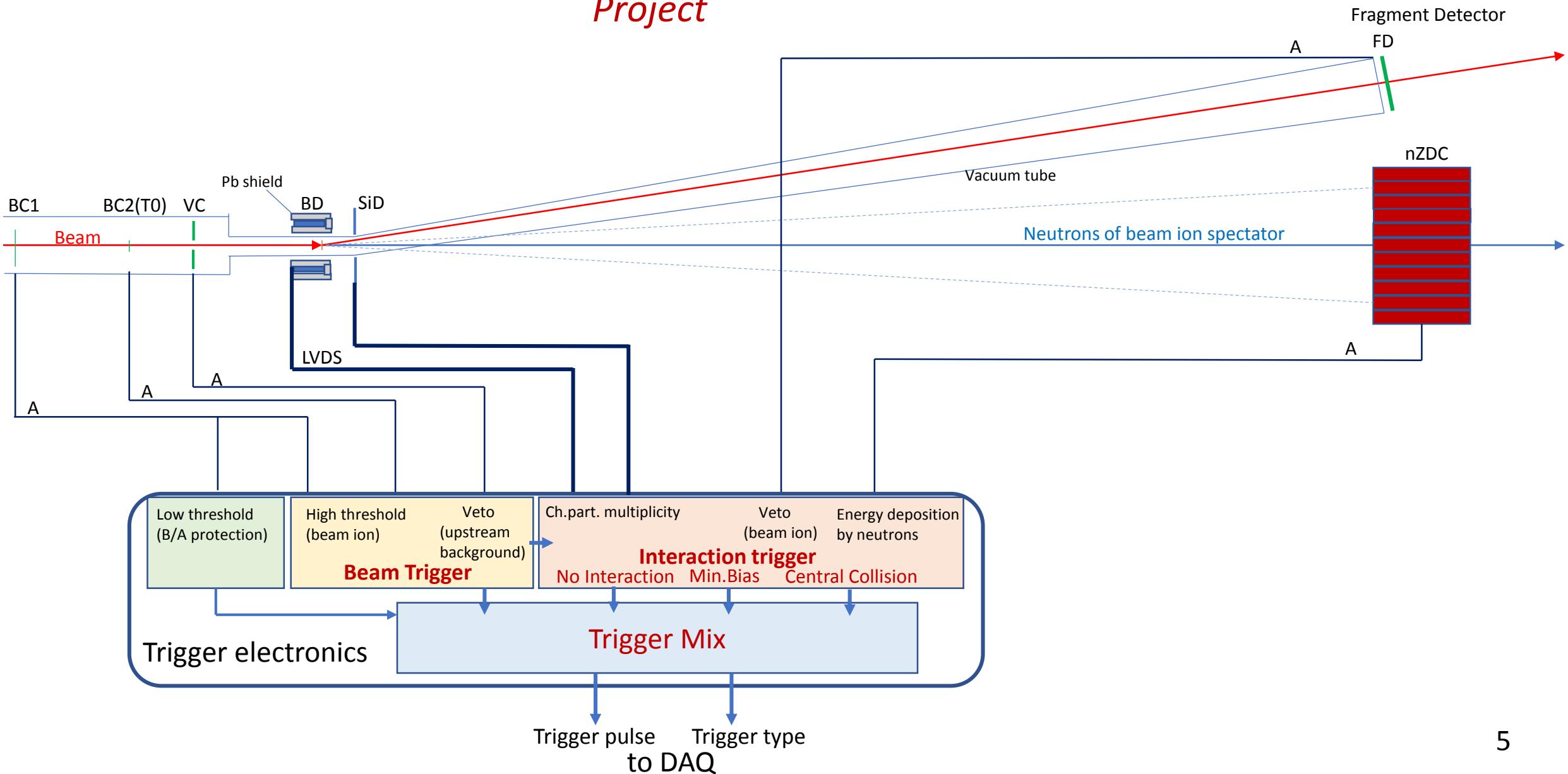
Au target (600-μm diam.)



95±2 % of Pb ions pass through Au target !

MC-SDD2 Correlation**Trigger Conditions**

BM@N Trigger System Project



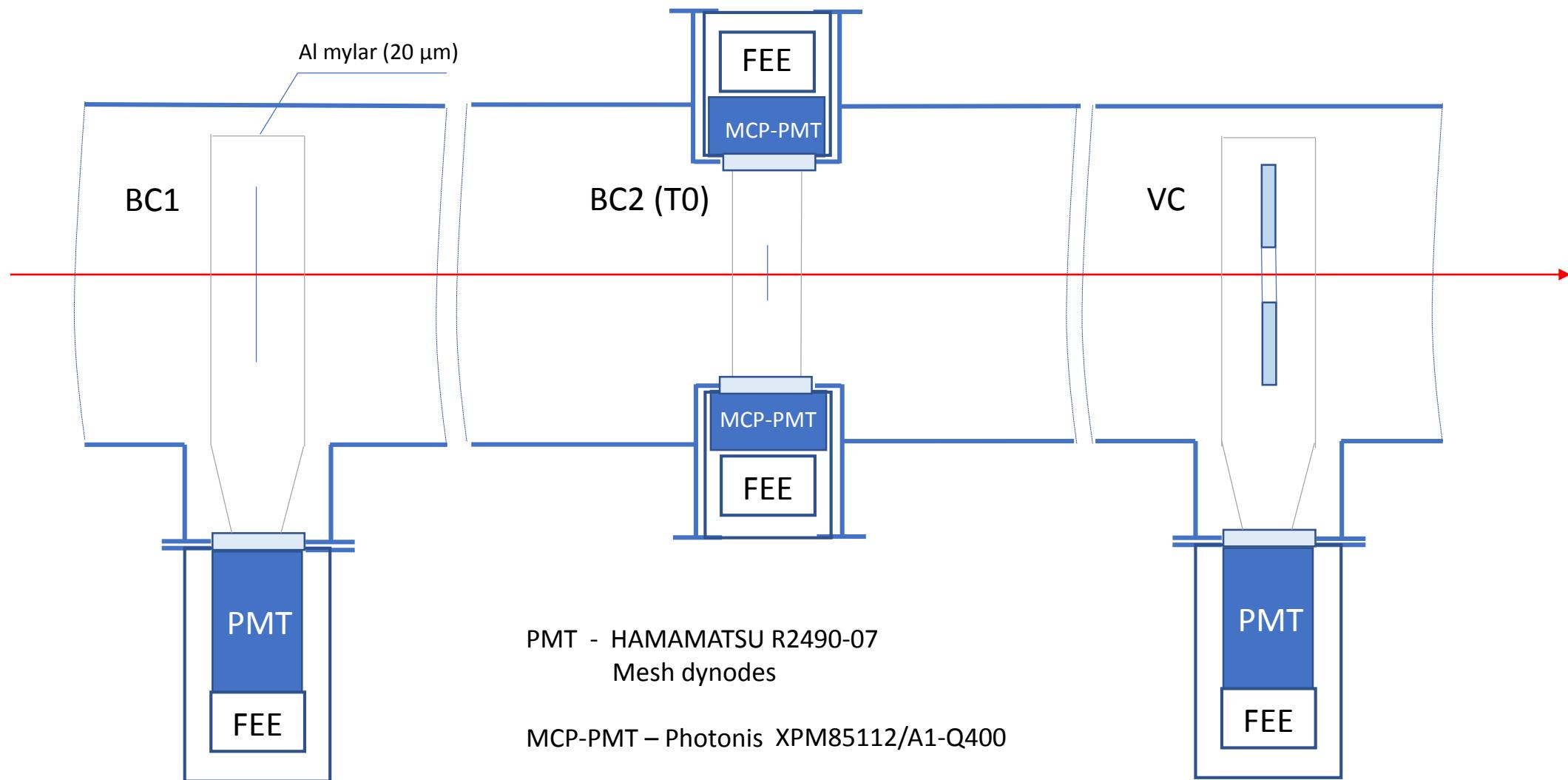
Triggers

#	Trigger type	Trigger logic	Comments
		<i>Physics Triggers</i>	
1	Beam Trigger (BT)	$BC1 * BC2 * VC_{veto} * (Reduction\ factor)$	data for analysis od efficiency and normalization
2	Min. Bias Trigger (MBT)	$BT * N_{MB}(BD + SiD) * FD_{veto} * nZDC$	Physics data
3	Central Collision Trigger (CCT)	$BT * N_{CC}(BD + SiD) * FD_{veto} * nZDC$	Physics data
		<i>Special triggers</i>	
4	No interaction	$BT * FD$	Study of background
5	Random Trigger (RT)		Study of detector operation
6	Generator Trigger (GT)		Study of detector operation
7	Calibration Trigger (CT)		Calibration of detectors

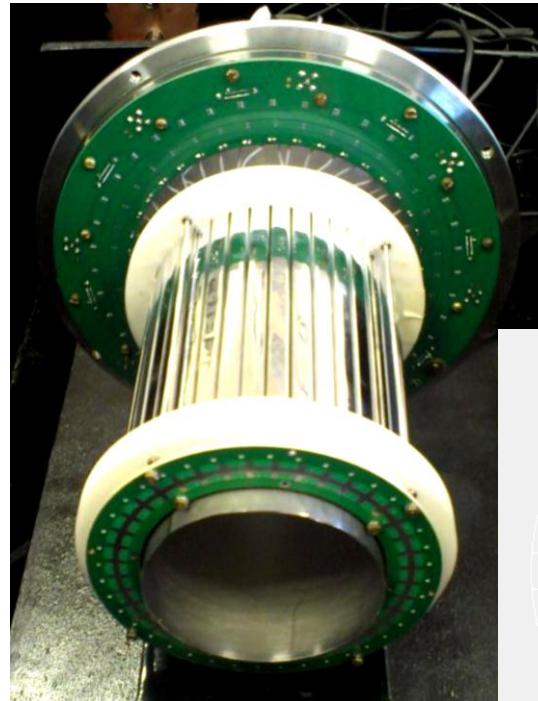
Trigger Detectors

#	Detector	Active area	Selection criteria	Comment
1	BC1	plastic scintillator BC-400B 100×100×0.25 mm ³	pulse height of beam ion	into vacuum beam tube
2	BC2	plastic scintillator BC-400B 30×30×0.15 mm ³	pulse height of beam ion	into vacuum beam tube
3	VC (veto)	plastic scintillator D100×10 mm ³ , hole D27 mm	pulse height of a few mips (veto of upstream halo)	into vacuum beam tube
4	BD (in Pb shield)	D92 mm, length = 150 mm, 40 strips of plastic scintillator BC-418, 150×7×7 mm ³ each	number of fired strips above threshold (to reject background)	number of fired strips increases with centrality of collision
5	SiD	silicon 500 µm, D186 mm, hole D52 mm, 64 strips	number of fired strips above threshold (to reject background)	number of fired strips increases with centrality of collision
6	FD (INP contribution)	quartz 150×150 mm ²	veto to pulse height of beam ion	used in Min.Bias trigger
7	nZDC (INP contribution)	modular hadron calorimeter ~100×100 cm ²	a few fired modules (>3) with total energy deposition > 3E _{beam} (GeV/u)	energy deposition depends on centrality of collision

Beam Detectors

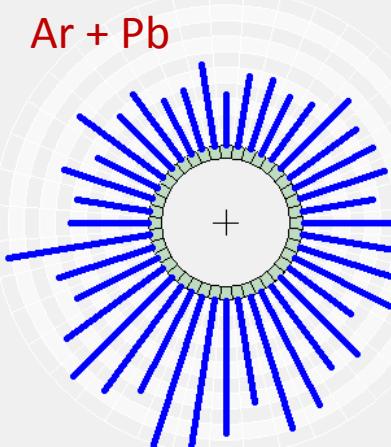


Barrel Detector

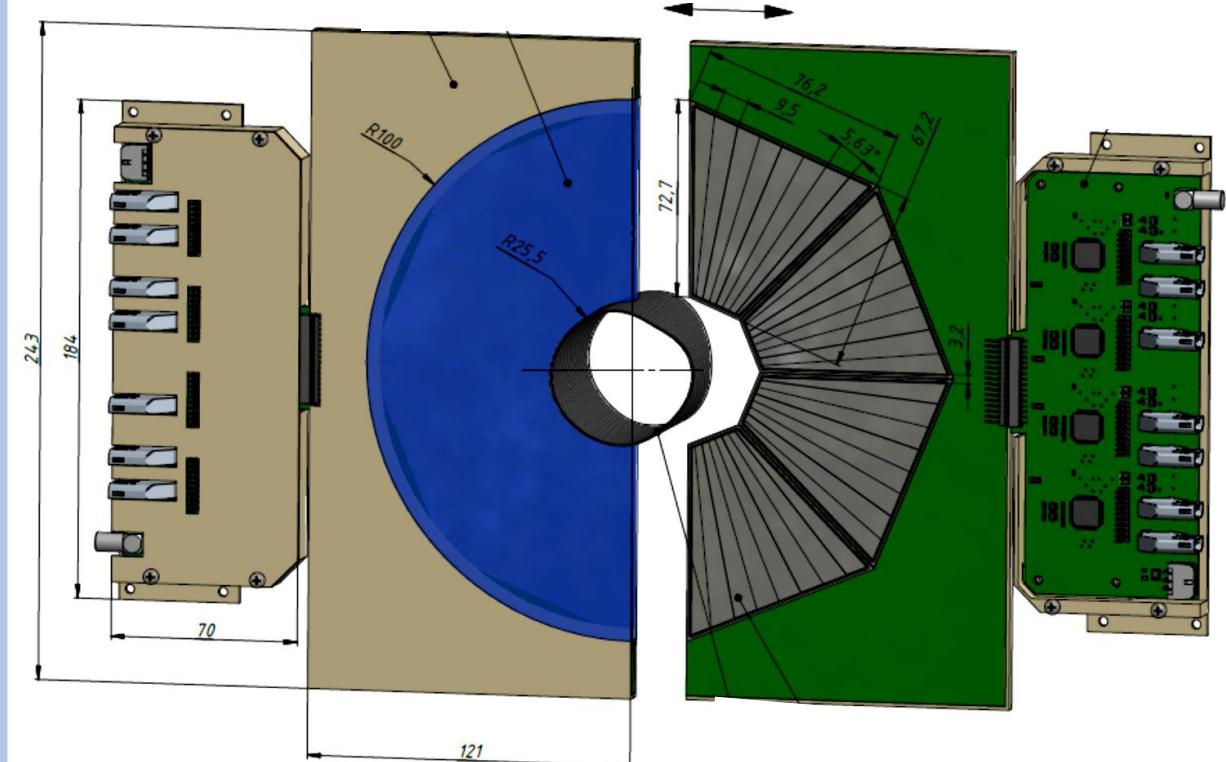


40 channels

- Upgrade plan:
- new electronics
 - mechanical support
 - Pb shield production



Silicon Detector



64 channels

Targets

#	Target	thickness	Aim
1	Empty		Study of background
2	Pb target D2 mm	~ 1 mm	Study of beam focusing on a target (max. trigger rate) and tracking system adjustment on IP to get the best resolution
3	Cu	1% target	Physics
4	Au	1% target	Physics

Beam & B/A protection

Value	Rate	Mean interval	Comments
Max. beam intensity	3×10^6 ion/s	330 ns	small background to fast interaction trigger and tracking detectors (thanks to strong magnetic field)
Interaction Trigger (1% target)	3×10^4 trig./s	33 μ s	
Trigger B/A protection		max. active time of BM@N detectors	used for runs with max. beam intensity
Beam B/A protection		max. active time of BM@N detectors	used for runs with low beam intensity