

# Status of the **BM@N** simulation and data reconstruction



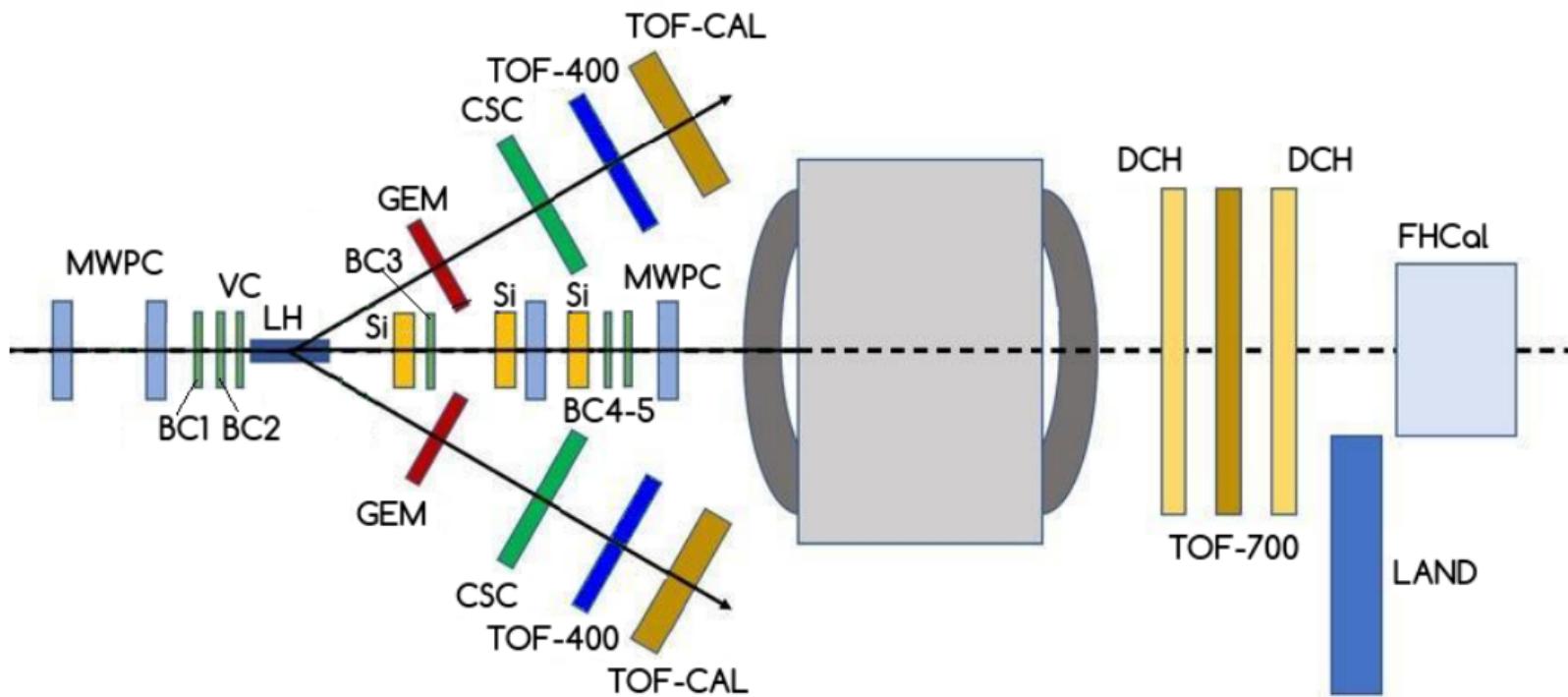
Sergei Merts  
on behalf of BERDS Group  
20/04/2021

## Main milestones:

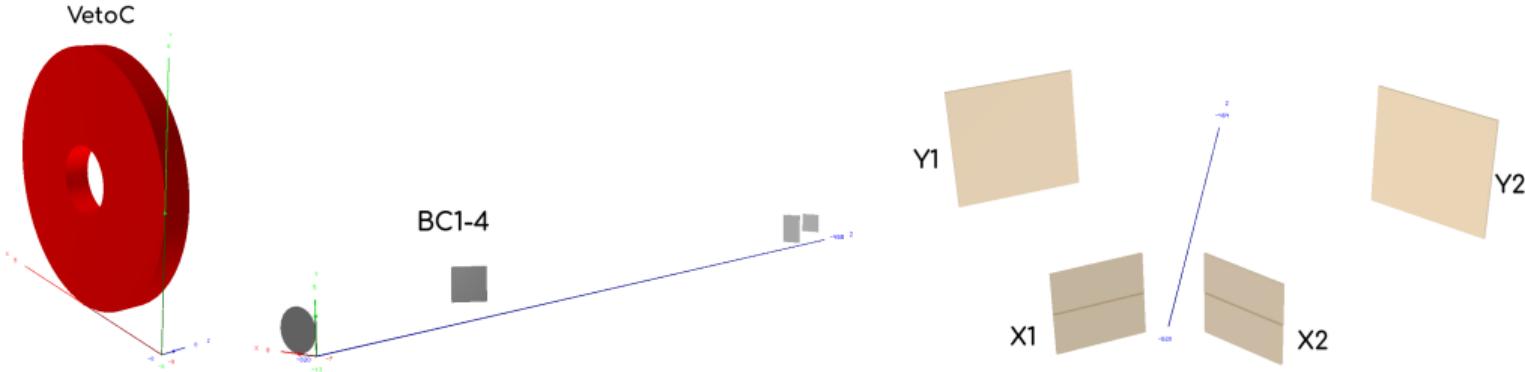
- December 2021, SRC RUN
- Spring 2022, BM@N RUN

- **Geo**: geometry description in ROOT format
- **MC**: classes for MC production
- **Digi**: imitation of detector redout structure
- **Reco**: implemented algorithm for 3D-points reconstruction (not for every detector)
  
- ✓ - everything is fine!
- ✓✗ - something need to be fixed
- ✗ - not ready yet!

# SRC Setup



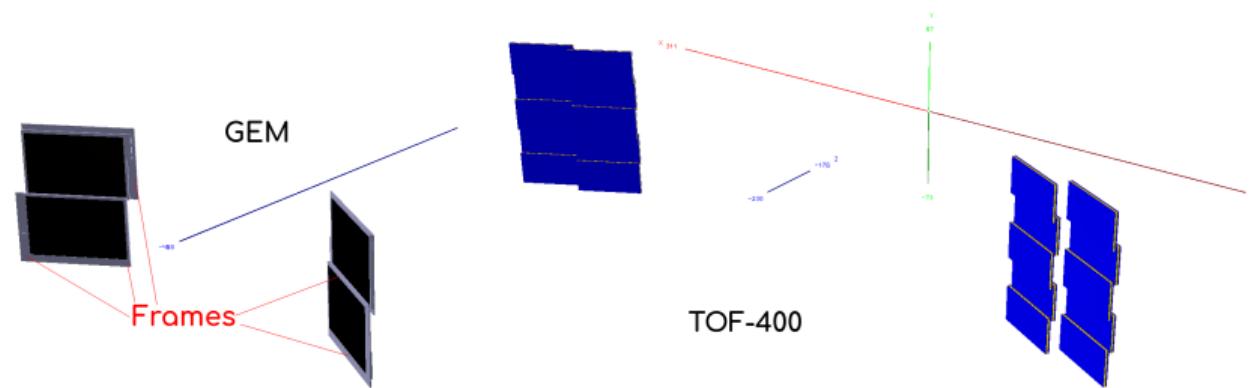
## Triggers summary table



Detector	Geo	MC	Digi	Reco	Comments
VetoC	✓✗	✗	✗	No need	Need to update geometry
BC1-2	✓✗	✓	✓✗	No need	Need to update geometry
BC3-5	✓✗	✓	✓✗	No need	Need to update geometry

A.Driuk (SPbU), N.Lashmanov (JINR)

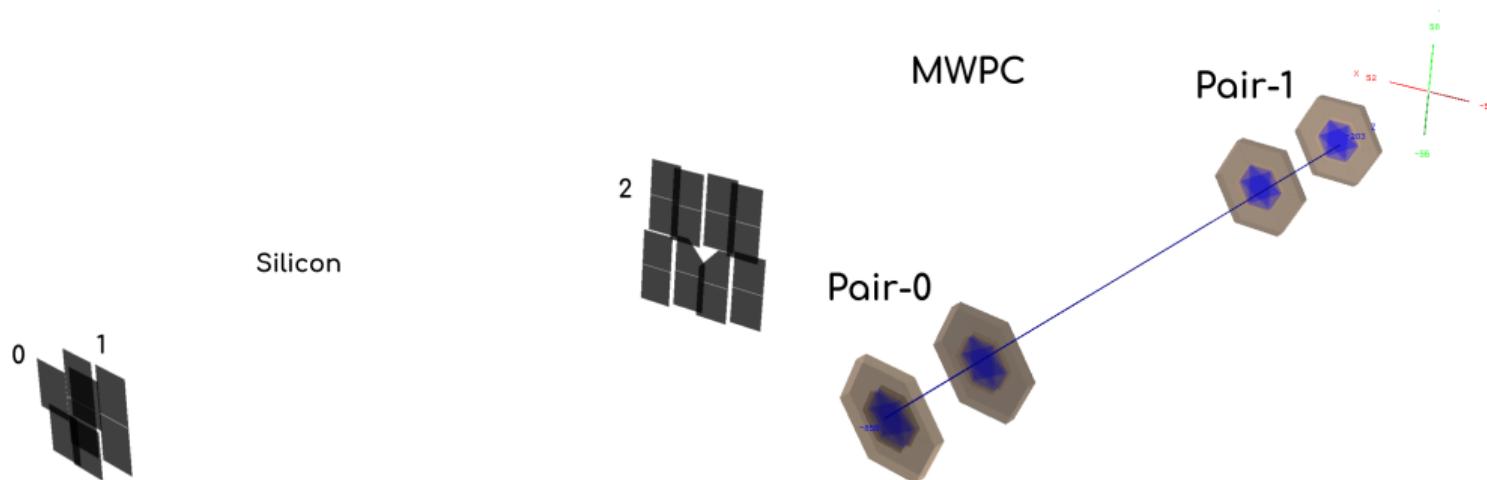
## Arm detectors summary table



Detector	Geo	MC	Digi	Reco	Comments
GEM	✓	✓	✓	✓	
CSC	✓✗	✓	✓	✓	Need to rotate existing geometry
TOF-400	✓	✓	✗	✓	Smoothing of MC points
TOF-CAL	✗	✗	✗	✗	No information yet

D. Baranov (JINR), M. Rumyantsev (JINR)

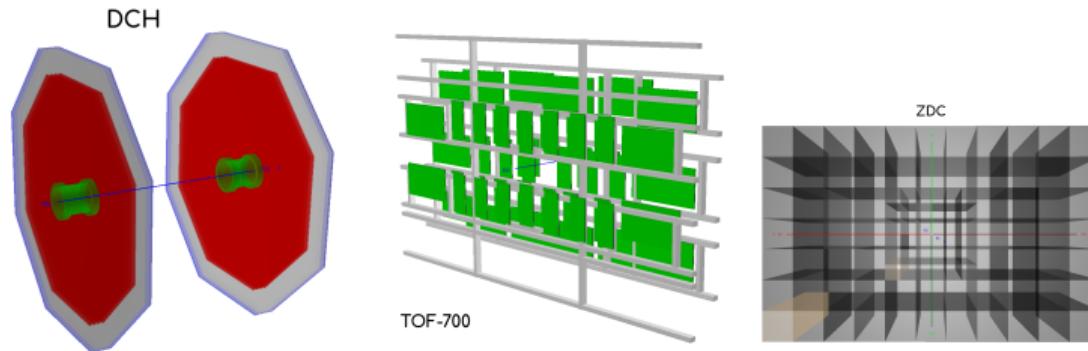
## Upstream detectors summary table



Detector	Geo	MC	Digi	Reco	Comments
Silicon	✓✗	✓	✓	✓	Need to update geometry
MWPC	✓✗	✓	✓	✓	Need to update geometry

D. Baranov (JINR), V. Lenivenko (JINR)

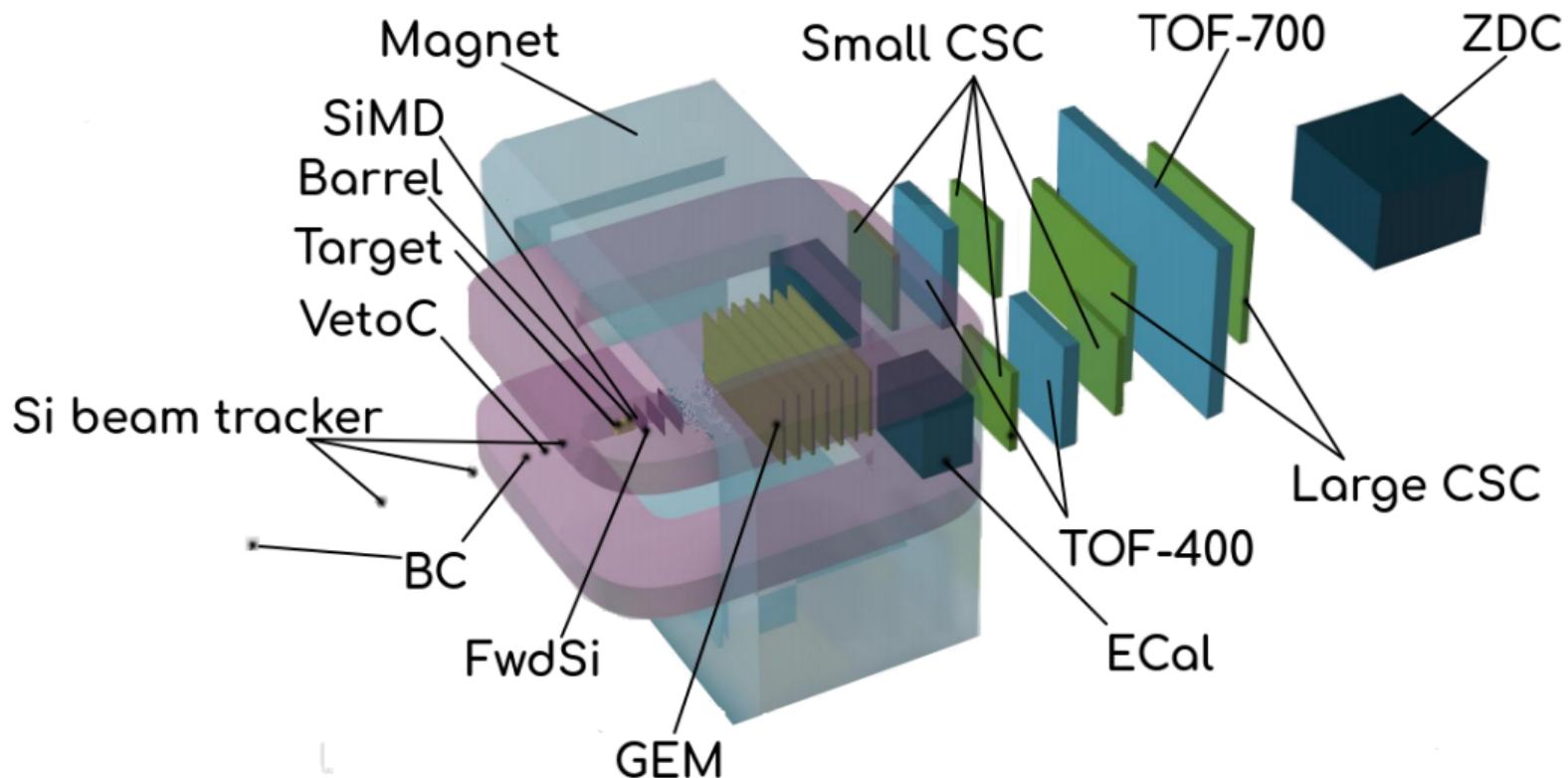
## Downstream detectors summary table



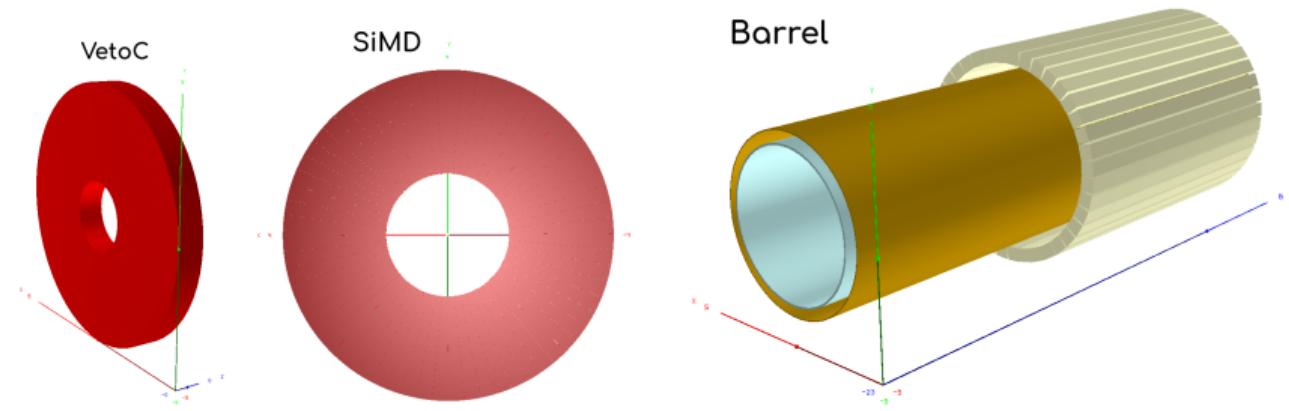
Detector	Geo	MC	Digi	Reco	Comments
DCH	✓	✓	✓	✓	
TOF	✓	✓	✗	✓	Smoothing of MC points
FHCAL	✓✗	✓	✗	✗	Need to check
LAND	✗	✗	✗	✗	No information yet

D.Baranov (JINR), N.Voitishin (JINR), Yu.Petukhov (JINR),  
P.Alekseev (ITEP)

# BM@N Setup

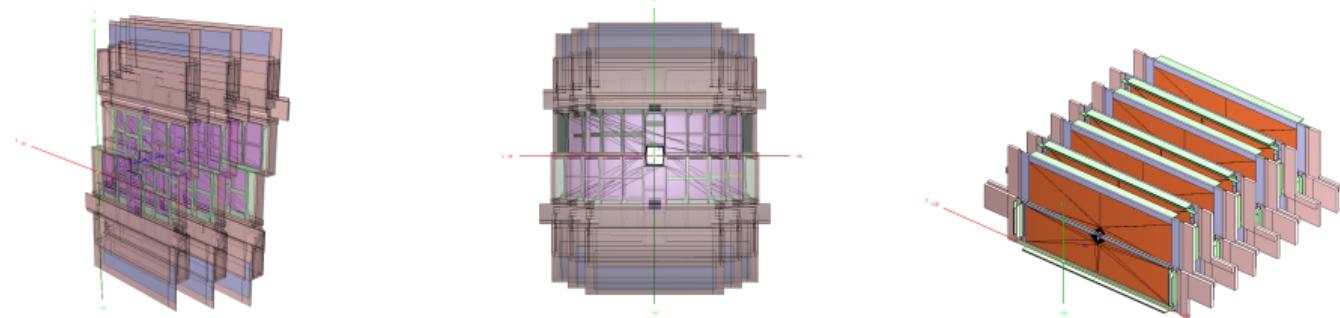


## Triggers summary table



Detector	Geo	MC	Digi	Reco	Comments
BC	✓✗	✓	✓✗	No need	Need to update geometry
VetoC	✓✗	✗	✗	No need	Need to update geometry
SiMD	✓✗	✓	✓✗	No need	Need to update geometry
Barrel	✓✗	✓	✗	No need	Need to update geometry

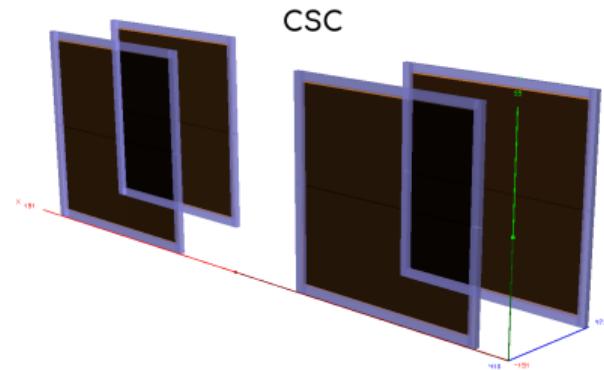
## Inner tracker summary table



Detector	Geo	MC	Digi	Reco	Comments
Forward Silicon	✓	✓	✓	✓	
GEM	✓	✓	✓	✓	

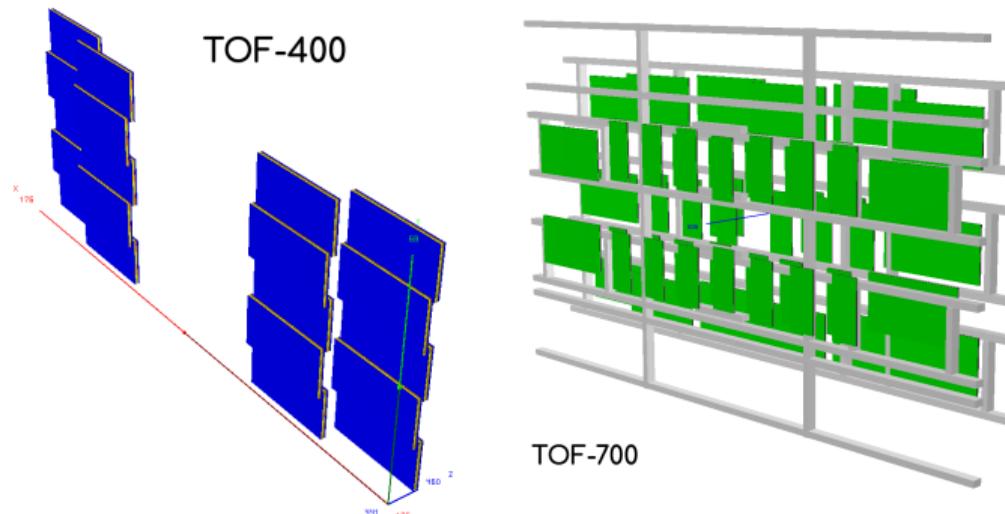
D. Baranov (JINR)

## Outer tracker summary table



Detector	Geo	MC	Digi	Reco	Comments
Si beam tracker	✗	✗	✗	✗	No information yet
Small CSC	✓	✓	✓	✓	
Large CSC	✗	✓	✓	✓	Work in progress now

D. Baranov (JINR)



Detector	Geo	MC	Digi	Reco	Comments
TOF-400	✓	✓	✗	✓	Smoothing of MC points
TOF-700	✓	✓	✗	✓	Smoothing of MC points

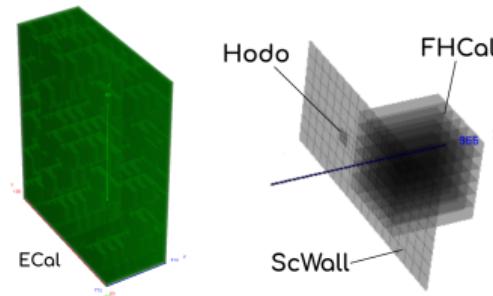
Yu.Petukhov (JINR), M.Rumyantsev (JINR)

S. Merts

VII collaboration meeting 20/04/21

15 / 20

## Calorimeters summary table



Detector	Geo	MC	Digi	Reco	Comments
ECal	✓✗	✓	✓	No need	
FHCAL (ZDC)	✓	✓	✗	No need	
HODO	✓	✓	✗	No need	
ScWall	✓	✓	✗	No need	

P.Alekseev (ITEP)

M.Golubeva, S.Morozov, N.Karpushkin (INR RAS)

- Most part of detectors is presented in simulation
- Geometry of all triggers need to be updated
- New Si beam tracker and arm calorimeter have to be implemented into simulation

## Some words about reconstruction

We have a new version of tracking, **Vector Finder** by A.Zinchenko

So, welcome to our **tracking family**:

- Cellular Automaton Tracking (CAT)
- Vector Finder (VF)
- BmnRoot tracking for BM@N setup
- BmnRoot tracking for SRC setup

Extremely important now to unify input and output data formats for all members of this family!

- Vertex finder approach in SRC setup changed from numerical to analytical. Reconstructed beam track is added for transverse coordinate calculation.
- For the BM@N setup vertex finder procedure was tuned to improve vertex resolution and number of reconstructed vertices.
- Converter for output data format is prepared for CAT.
- Estimation of hit errors influence on tracking efficiency is under study.
- Upstream tracking for MC case is implemented in the BmnRoot.
- Realistic DCH hit producer for MC case is implemented in the BmnRoot.
- Hit reconstruction is added for BC3, BC4 and arm triggers of the SRC setup
- ...

Thank you!