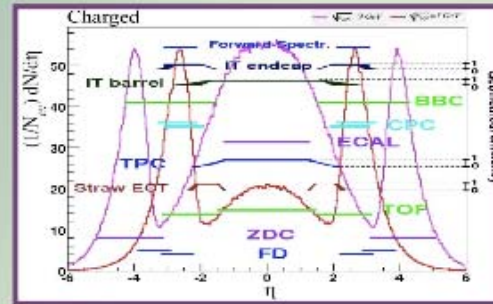


# Physics programme of MPD

## MPD tasks

The NICA/MPD project is aimed to study of hot & dense baryonic matter  
at  $A=1-197$ ,  $\sqrt{s_{NN}} = 4 - 11 \text{ GeV/u}$ ,  $L = 10^{27} \text{ cm}^{-2}\text{s}^{-1}$

- bulk observables (hadrons):
  - 4 $\pi$  particle yields
- multi-strange hyperon production :
  - yields & spectra
- electromagnetic probes
- event-by-event fluctuation in
  - hadron productions
- correlations involving  $\pi$ , K, p
- directed & elliptic flows for
  - identified hadrons



Particle yields in Au+Au collisions  $\sqrt{s_{NN}} = 7.1 \text{ GeV}$   
Luminosity  $L = 10^{27} \text{ cm}^{-2}\text{s}^{-1}$  Event rate (central) 700

Particle (mass)	Multiplicity	decay mode	BR	$\epsilon$ (%)	yield ( $\text{s}^{-1}$ )	yield 10w
$K^-$ (494)	55	—	—	20	$7.7 \cdot 10^4$	$1.5 \cdot 10^6$
$K$ (494)	16	—	—	20	$2.2 \cdot 10^4$	$1.3 \cdot 10^6$
$\rho$ (770)	23.6	$e^+e^-$	$4.7 \cdot 10^{-3}$	2	$1.6 \cdot 10^2$	$9.4 \cdot 10^2$
$\omega$ (782)	14.2	$e^+e^-$	$7.1 \cdot 10^{-3}$	2	$1.4 \cdot 10^2$	$8.6 \cdot 10^2$
$\phi$ (1020)	2.7	$e^+e^-$	$3 \cdot 10^{-2}$	2	$1.1 \cdot 10^2$	$6.9 \cdot 10^2$
$\Lambda$ (1321)	2.4	$\Lambda\pi$	1	4	67	$4.0 \cdot 10^3$
$\Omega$ (1672)	0.16	$\Lambda K$	0.68	2	1.5	$9.2 \cdot 10^3$
$D^+$ (1864)	$7.5 \cdot 10^{-4}$	$K\pi$	0.038	1	$2.0 \cdot 10^{-4}$	1200
$J/\psi$ (3097)	$3.8 \cdot 10^{-5}$	$e^+e^-$	0.06	5	$8.0 \cdot 10^{-5}$	480

- complete overlap with CBM
- partial overlap with STAR-BES, NA61

# Collider vs. fixed target

- Collider experiment
  - uniform azimuthal acceptance
  - no problems in accomodating different beam energies
  - typically mid-rapidity; difficult to access very forward  $y$
  - spectator measurement difficult
- Fixed target experiment
  - acceptance from mid-rapidity to (close to) beam
  - no azimuthal symmetry (typically dipole magnet)
  - acceptance changes with beam energy
  - no rate limitation by beam

# To be discussed

- What is the additional information expected to be delivered by MPD with respect to programmes already running or in planning?
- Are there observables which are accessible exclusively by MPD?
- Does the additional information justify the efforts?