MATERIALS SCIENCE AND ENGINEERING VS. MEGASCIENCE PROJECTS

The Round table, September 17, 2019

National University of Science and Technology MISiS

Megaproject “Nuclotron-based Ion Collider fAcility”

NICA:

Basic and Applied Researches, Breakthrough Technologies

Igor Meshkov

Joint Institute for Nuclear Research

Dubna, Russia

Goals for Basic Research and Three Stages of the NICA Project

We intend to study the Universe

as it was 13.799 ± 0.021 billion years ago (Planck Mission data, 2015)

and ~ 1 μs after Big Bang;

We wish to try to understand the nature of particle spin.

Stage I: Fixed target experiment

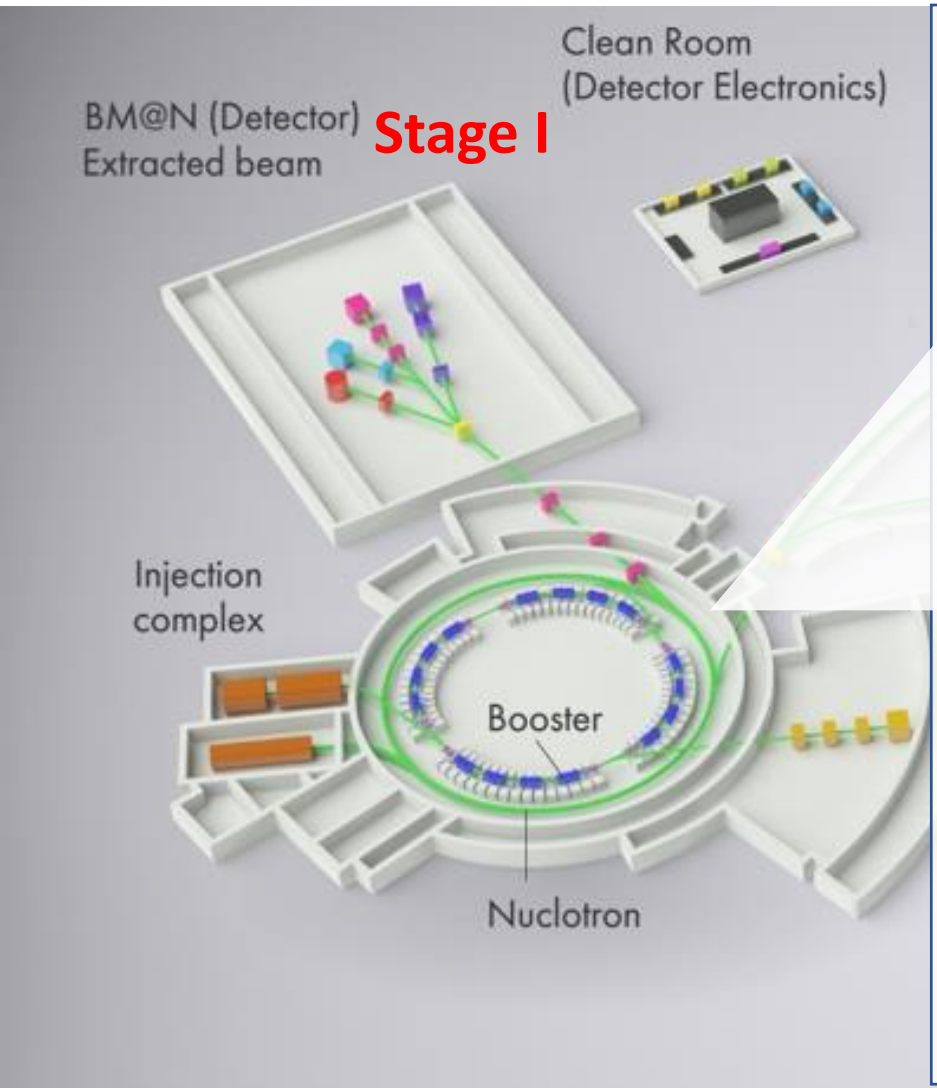
"The Baryonic Matter at Nuclotron" (BM@N) 2019 => …

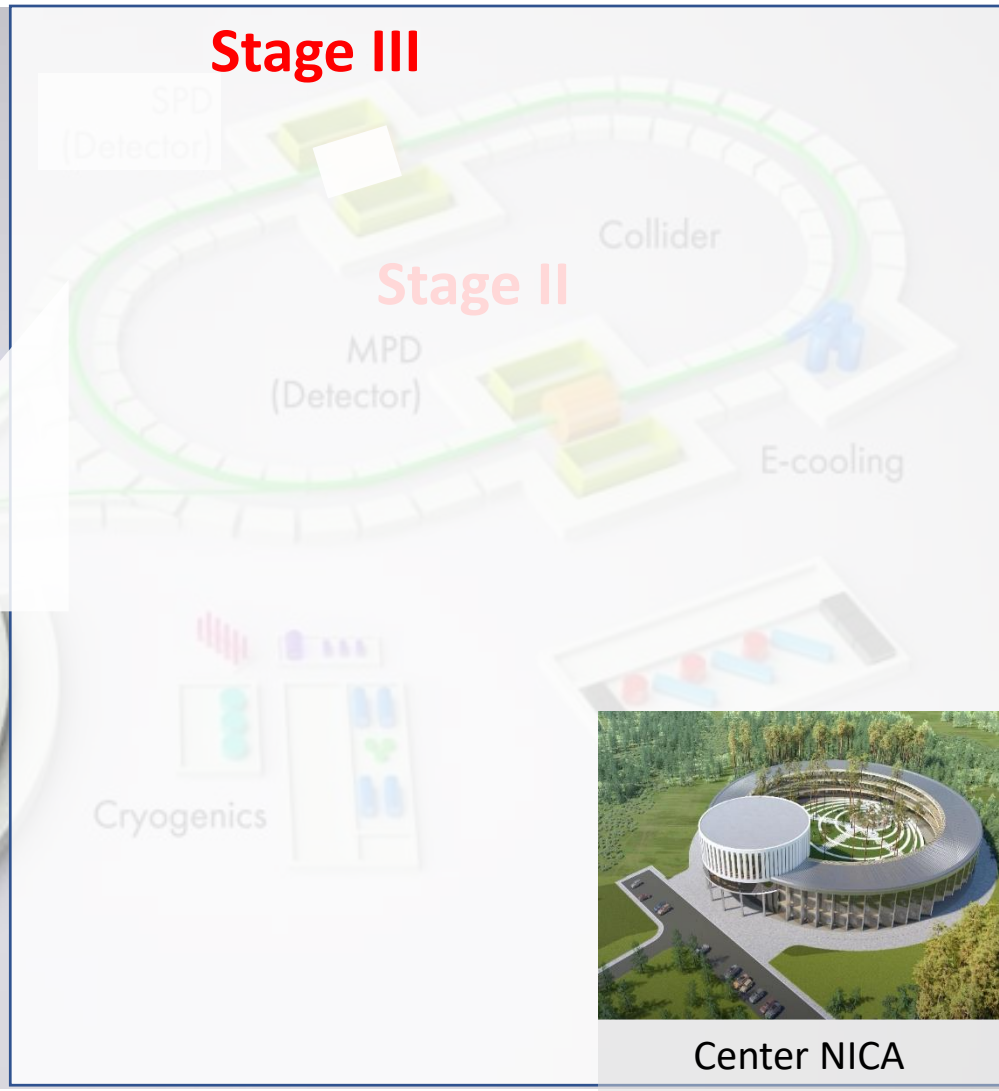
Stage II : Search for The Mixed Phase and New Physics

in Heavy Ion Collisions at NICA Collider 2022 => …

Stage III: Polarized Beams' Mode of The Collider 2025 => …

What is the NICA

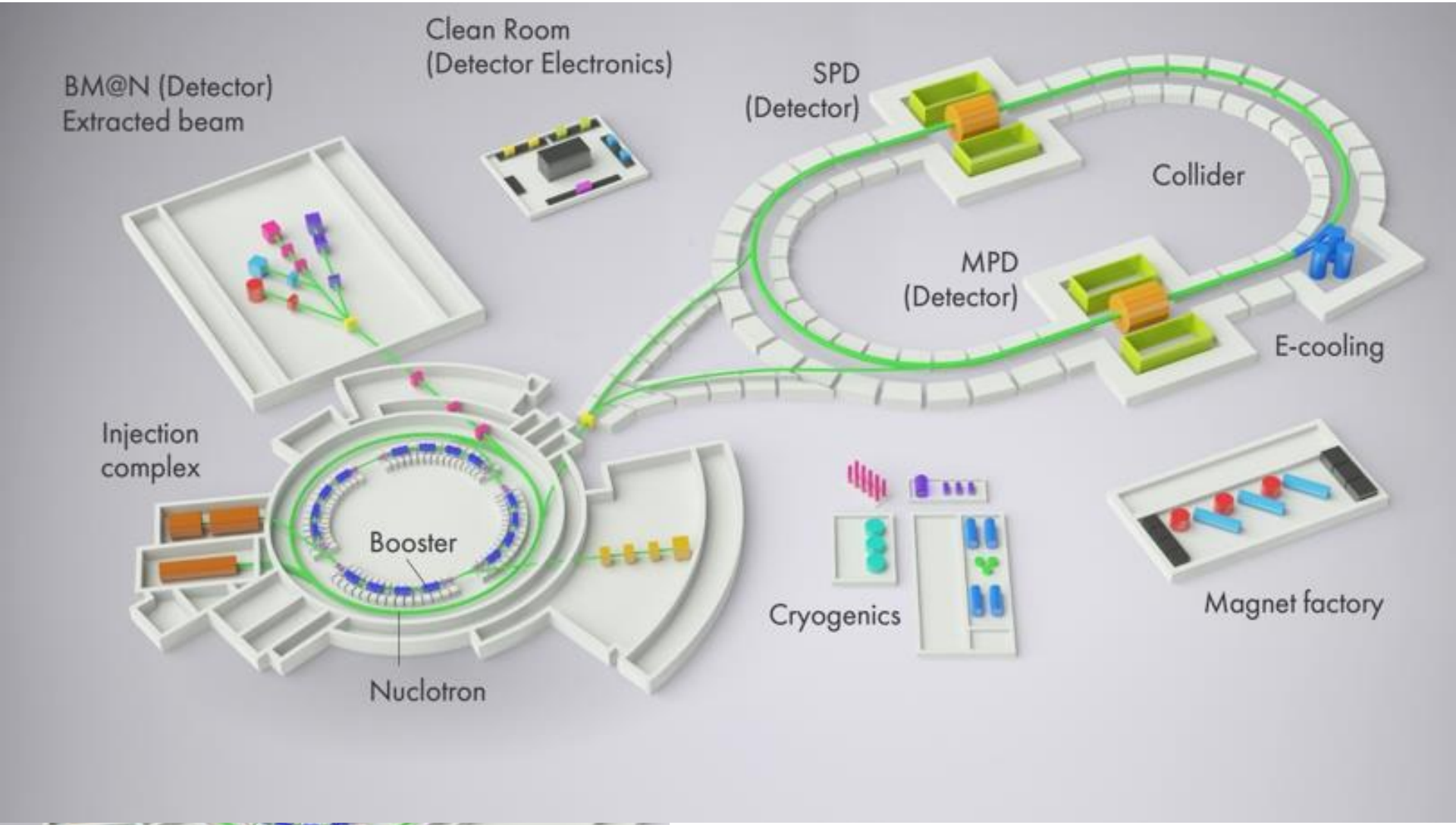




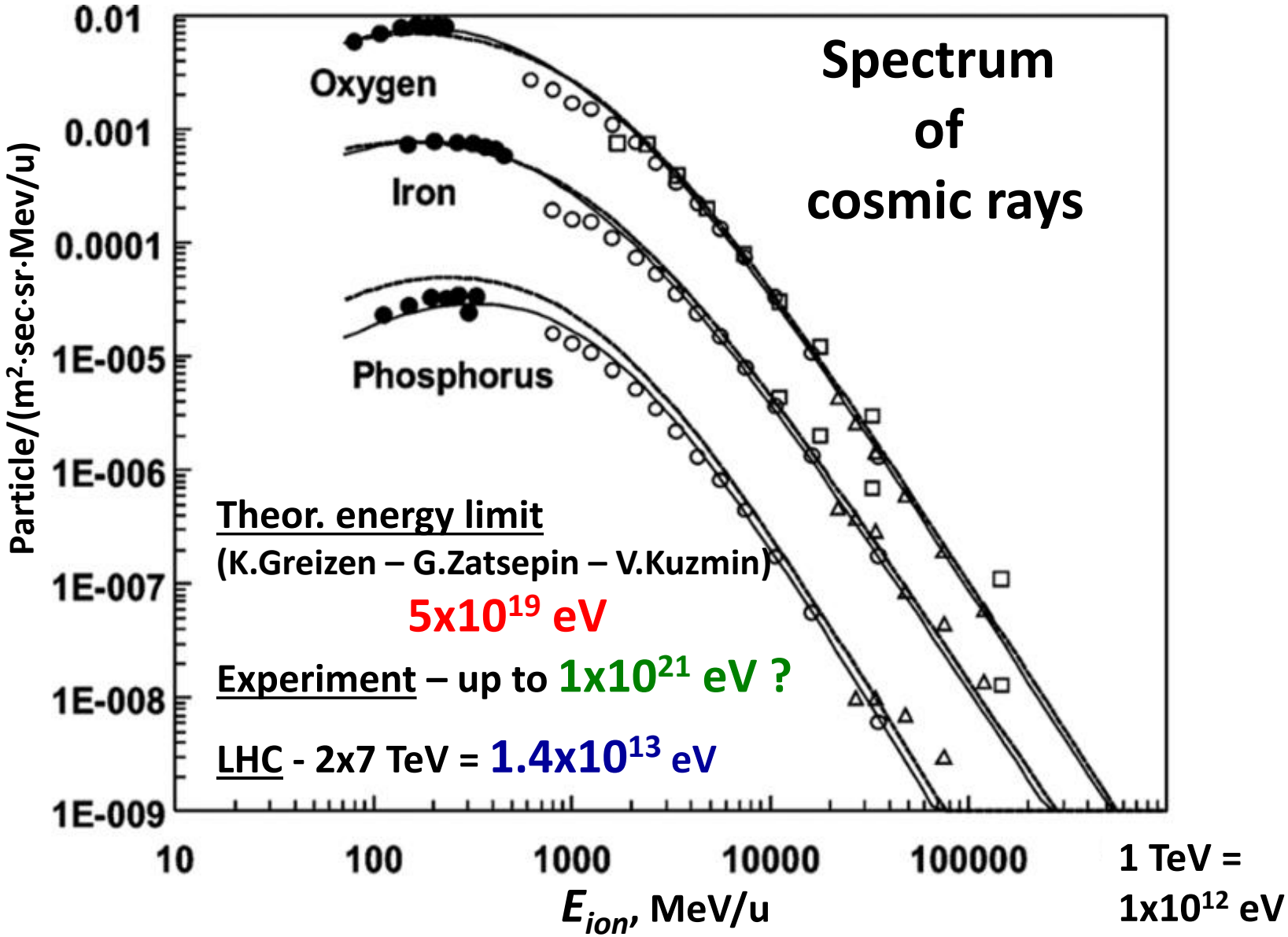
Center NICA

NICA – How will it look like

What is the NICA

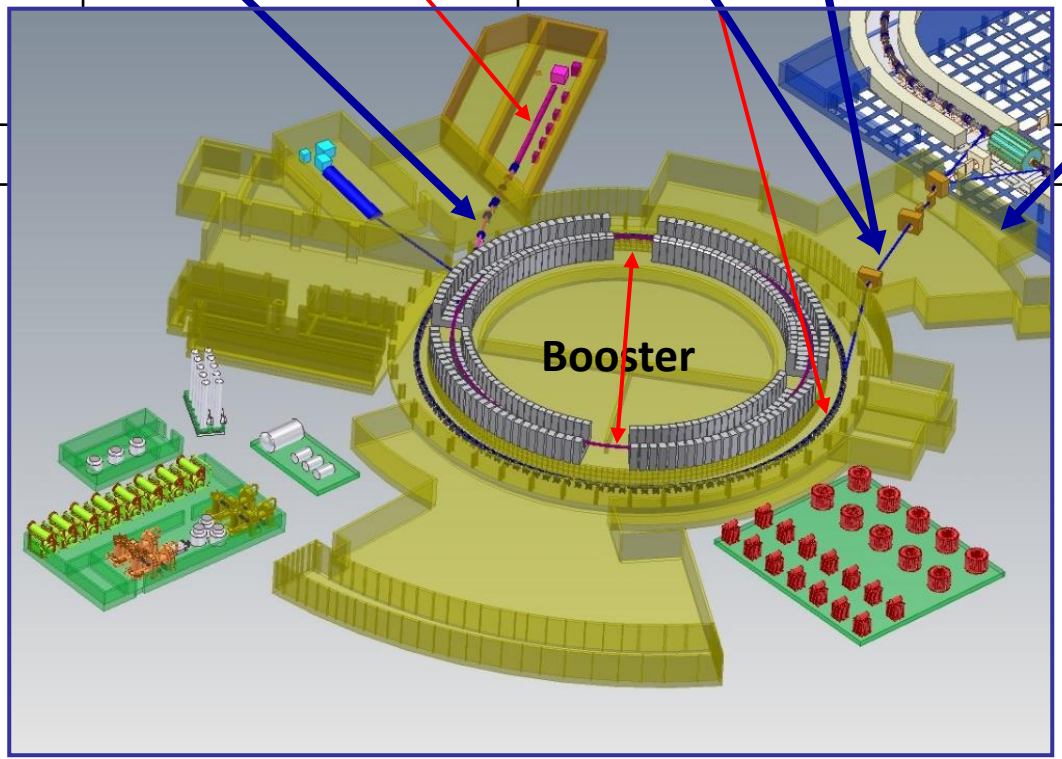


MICROELECTRONICS RADIATION DAMAGE BY COSMIC RAYS



THREE AREAS OF NICA ACCELERATOR COMPLEX FOR APPLIED RESEARCH

Area & accelerators	Area–1 Low energy beams, HILAc, 3.2 MeV/u	Area–2 Medium energy beams, Nuclotron, 150-800 MeV/u	Area–3. High energy beams, Nuclotron, < 4.5 GeV/u
Ions	$^{40}Ar^{+}$ – $^{197}Au^{+}$	$^{40}Ar^{+}$ – $^{197}Au^{+}$	$^{2}d^{1+}$, $^{7}Li^{+}$, $^{12}C^{+}$
Flux, $s^{-1}\cdot cm^{-2}$	10^{3} - 10^{5}	10^{3} - 10^{5}	$2\cdot10^{7}$ *)
Application	Radiation resistance in microelectronics	Radiation resistance in microelectronics Radiobiology	Relativistic nuclear energetics (power engineering); Utilization of radioactive waste
			*) 10^{10} per 5 s over 100 cm^{2}



The new Nuclotron beamlines for chip irradiation and radiobiological research