

# CREMLIN P<sup>+</sup>LUS

Connecting Russian and European Measures  
for Large-scale Research Infrastructures



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 871072

## Joint Institute for Nuclear Research

IBR-2 REACTOR



# + 1. Location of the facility: Russia, Moscow region, Dubna

Dubna



Russia



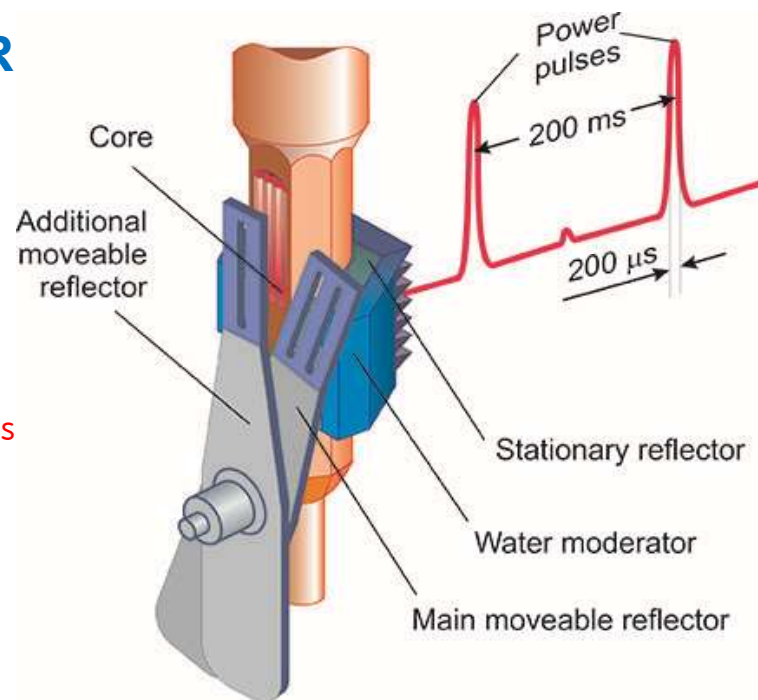
Moscow region

## + 2. Facility uniqueness (key advantages and opportunities open up for researchers)

### IBR-2 @ FLNP JINR

Reactor operation for physics experiments, h/year ~2500

V.N. Shvetsov  
Quantum Beam Sci. 2017,  
1(1), 6;  
[doi:10.3390/qubs1010006](https://doi.org/10.3390/qubs1010006)



Average/in burst power, MW	2/1850
Fuel	PuO <sub>2</sub>
Number of fuel assemblies	69
Maximum burnup, %	9
Pulse repetition rate, Hz	5; 10
Pulse half-width, μs:	
fast neutrons	200*
thermal neutrons	340
Rotation rate, rev/min:	
main reflector	600
auxiliary reflector	300
MMR and AMR material	nickel + steel
MR service life, hours	55000
Background, %	7.5
Thermal neutron flux density from the surface of the moderator:	
- time average	~ 10 <sup>13</sup> n/cm <sup>2</sup> ·s
- burst maximum	~ 10 <sup>16</sup> n/cm <sup>2</sup> ·s

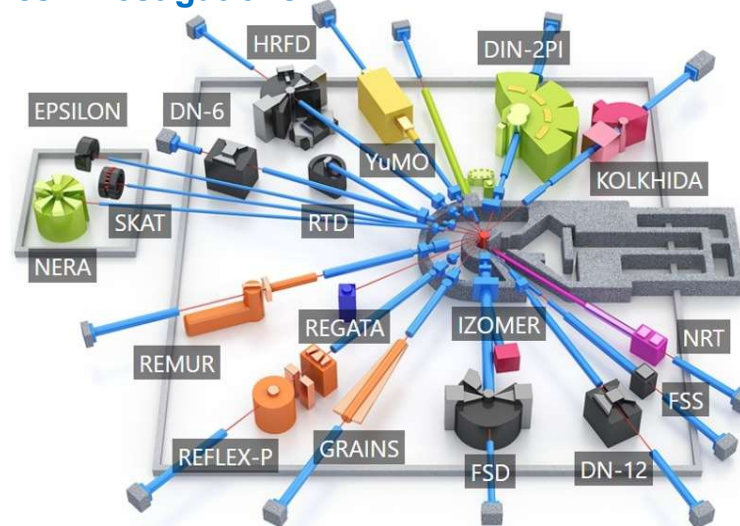
\*at mean power 2MW



## + 2. Facility uniqueness (key advantages and opportunities open up for researchers)

### A total of 19 facilities

- 17 for condensed matter investigation by:
  - neutron scattering 15
  - radiation hardness tests 1
  - Instrumental Neutron Activation Analysis 1
- 2 for nuclear neutron physics investigations



**Since 1995**  
**International open access program**  
**In the program today**  
**12 facilities + 1 coming up in March 2020**  
**(postponed for autumn 2020)**

**Diffraction:** HRFD, RTD, DN-6, SKAT, Epsilon, FSD, DN-12, FSS

**Small-angle scattering:** YuMO

**Reflectometry:** REMUR, REFLEX, GRAINS

**Inelastic scattering:** DIN-2PI, NERA

**Neutron imaging:** NRT

**Nuclear Physics:** ISOMER, KOLKHIDA

**Neutron Activation Analysis:** REGATA

**Irradiation Facility**

## + 2. Facility uniqueness (key advantages and opportunities open up for researchers)

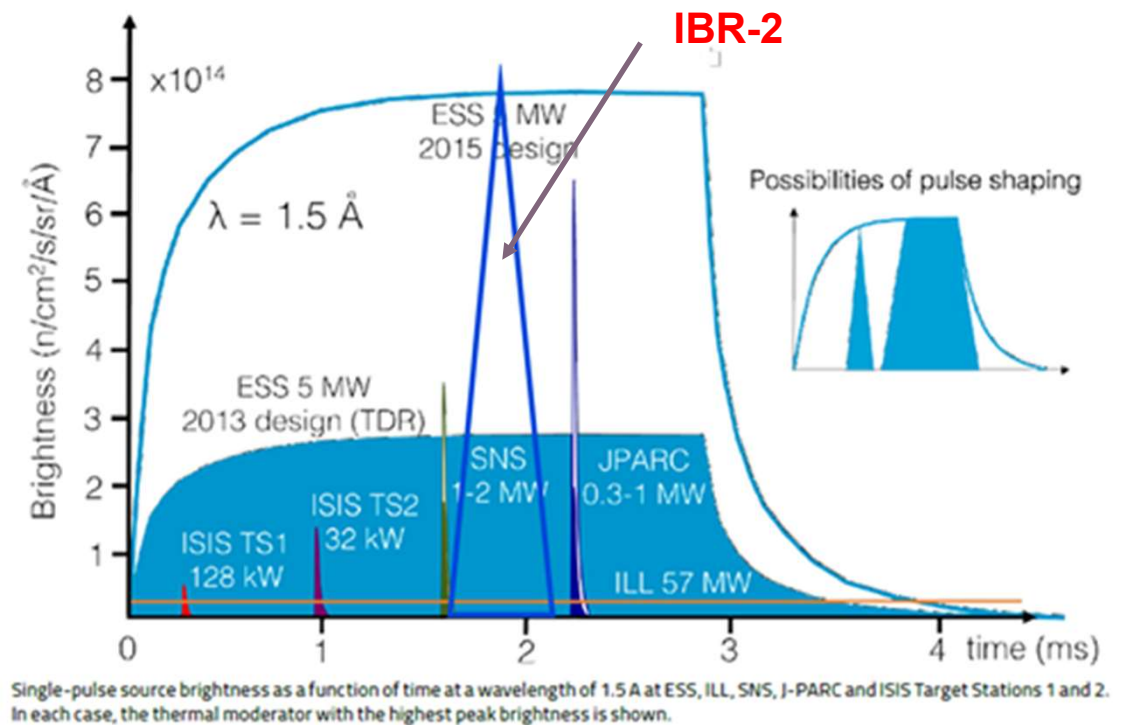
**High flux**  
**pulsed fast neutron source**  
 $\sim 10^{16} \text{ n/cm}^2 \cdot \text{s}$  in burst  
from the surface of moderator

**High single pulse brightness**

**Longest pulse in the world**  
**until ESS will start operation!**

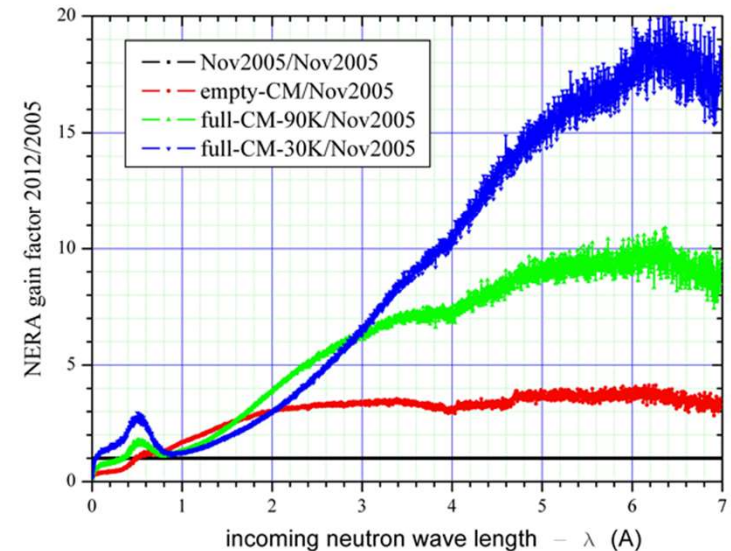
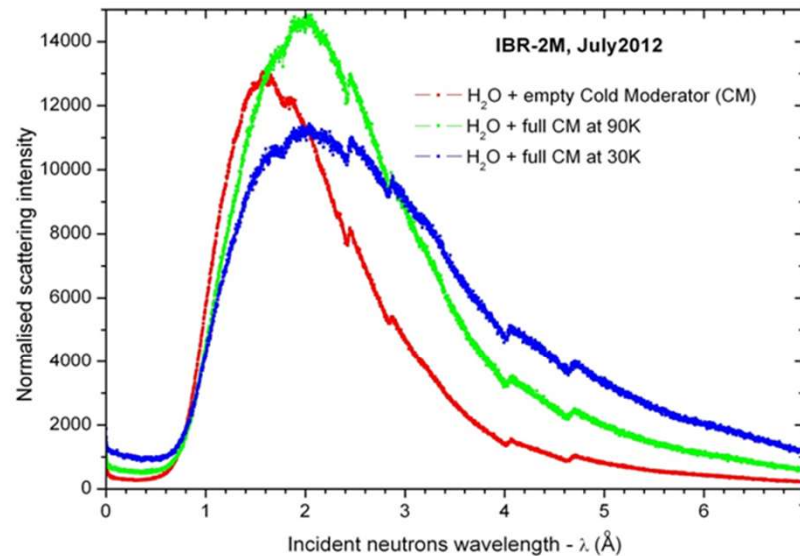
Pulse half-width,  $\mu\text{s}$ :  
fast neutrons 200  
thermal neutrons 340

**Low pulse frequency**  
**allows to avoid neutron bunches**  
**overlapping at long base stations**



## + 2. Facility uniqueness (key advantages and opportunities open up for researchers)

Since 2012 operational bi-spectral neutron moderator for 6 of 15 spectrometers



### 3.Existing types of access to the facility (direct, remote, online, etc.)

#### **Direct access is organized**

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- The user chooses if he wants to directly participate in the experiment or prefers to send samples for measurement.
- This is of course only possible if the samples should not be prepared just before experiment.
- If the user chooses to send his samples and not participate in the experiment, he has the opportunity to arrange with the local responsible to organize remote monitoring of the experiment. *The remote access is not regulated by the access rules yet, so that it remains to be considered by the person responsible for the installation.*

The access grants to machine time, computing resources, software, data obtained from personal samples, sample preparation limited by the FLNP JINR laboratory infrastructure, the set-up, execution and dismantling of experiment, expert support and raw data analyses.



## 4. How is the access of users regulated?

### Open access \ Regulated access to the facility (if available)

FLNP JINR practices an open access policy, with no restriction on the nationality of its users or the institution from which they come.

**Excluding condition:** As mentioned in the JINR Charter (<http://www.jinr.ru/docs-en/>) "The research results obtained at the Institute can be used only for peaceful purposes for the benefit of the whole mankind"

All Users visit JINR campus and work on IBR-2 beamlines, together with the JINR beamline scientists and staff, to perform their experiments.

There are mainly 2 types of Users: **External Users** and **Internal Users**

1. De jure, Principles of FLNP JINR user policy do not define different categories of **External Users**, but de facto three categories of Users exists: General Users, Participatory teams and Industrial Users.

**General Users:** (groups of) scientists who are allocated beam time to conduct experiments at IBR-2 beamlines based on proposals that have been passing through a scientific merit evaluation;

**Participatory Users:** these are research teams that have contributed to the funding, building and/or operation of IBR-2 beamlines. There are divided in two categories:

- a. the users of SKAT and EPSILON facilities and their access falls under the Agreement of JINR and BMBF Germany. The technical details of the collaboration are described in the Agreement between the FLNP and Karlsruhe Institute of Technology (KIT). The measuring time allocated for the non-German and non-JINR users has not to exceed 30% of the total available annual time. The requested beam time will be ranked according to scientific excellence and allocated under the rules of the FLNP JINR user policy after consultation of KIT project leader. The FLNP JINR-KIT agreement is under review.
  - b. Russian teams granted by the Russian Science Foundation (RSF). They appeared in 2019 therefore the [Principles of FLNP user policy](#) are under review now;
- Industrial Users** are associated with General Users if the results of research will be published.

65% of the beamtime is dedicated to External Users. 55% of the beamtime is dedicated to external regular applications and 10% to External fast applications.

2. **Internal Users:** up to 35% of the beam time will normally be available for the in-house use of IBR-2. The applications also pass through the scientific merit evaluation.



## 5. Please describe any available procedure and access policy for external users (including foreign users), availability of special type of service such as visa (for scientists, etc.)

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What are the procedures for Access? Are they different depending on the type of User?

*All Users have to reply to a Call for proposals (generally launched online twice per year)*

*For Industrial Users: the proposals are directly evaluated by the FLNP JINR directorate.*

Is the Access to your Research facility defined in terms of Access Units? How is the unit defined?

*No Access Units are defined.*

Is the access to the facility for free or upon payment?

*The use of the facility for all users is for free if the results of the experiments are subject of publication in scientific journals. For Industrial Users which refuse publication the access is upon payment and the fee to be charged for any single experiment will be determined by the FLNP JINR Directorate based on a market analysis.*



If there is a selection process to evaluate the experiment proposals at your RIs, how is it defined? What are the evaluation criteria? Who is evaluating the proposals?

The selection process is the same for all Users besides those Industrial Users which don't plan to publish the results.

•The evaluation procedure consists in a preliminary Technical feasibility, Safety check and Availability of the resources required and in a Peer-review scientific assessment conducted by three external and independent Expert Committees (Atomic and magnetic structure, Lattice and molecular dynamics, Nanosystems and Soft Matter). A fourth Committee is going to be established in order to cover the topics using NAA.

In evaluating proposals and determining their priority, the ECs will use the following criteria:

- a. scientific merit (interpreted as: relevance, impact, innovation);
- b. capability of the proponent(s);
- c. the degree to which neutrons are needed.

While a General User and a Participatory user are getting the same grade, the Participatory user has priority.

- For Industrial Users which do not publish the proposals are evaluated by the FLNP JINR Directorate.

After the evaluation process the beamtime is scheduled by User Office Management and scientific staff.



If a scientists wants to use the services available in your Research facility, what should he/she do? Is there an application scheme? Should his/her affiliation Institute establish an agreement with your facility beforehand or the access is open to any Institute?

All Users need to reply to a Call for proposals (generally launched online twice per year and published on IBR-2 User Club (ibr-2.jinr.ru) website). The interested scientists should first register with the IBR-2 User Club and then submit their proposal for experiment following the instructions given therein. Everything must be done online. The information about the call for proposals opening and the deadlines are published on IBR-2 User Club Website and are sent to all users that are registered on the IBR-2 User Club portal (mailing lists).

The interested scientist may contact the Users Office and the beamline scientists at any time of the year to receive more detailed information about the techniques and tools available and about the selection process and dates.

The Industrial Users ready to publish results are invited to apply on regular rules. The others need to contact directly the FLNP JINR User Office.

FLNP JINR is open to all scientist and to all Institutes, no preliminary agreement or partnership is needed.

**What are the services available for Users? (e.g. do you offer support for Visa preparation? Do you offer accommodation?...)**

The FLNP JINR Users Office is coordinating the Users Activities and is the focal point for the organization of the visit of the Users. There is local funding available to cover the local expenses that Users from JINR member states need to face (transport from Moscow airport to Dubna and back with JINR cars, local accommodation at JINR hotel including breakfast, per diem). One person from one institution is supported (maximum 2 persons per experiment). If an additional person is willing to attend the experiment on his one costs, JINR is providing all necessary technical support. Accommodation is available at JINR hotel. The Users from non-JINR member states can profit from a lower rate accommodation if the booking is performed by the User Office. The User Office prepares the first necessary documents for organizing the visit.

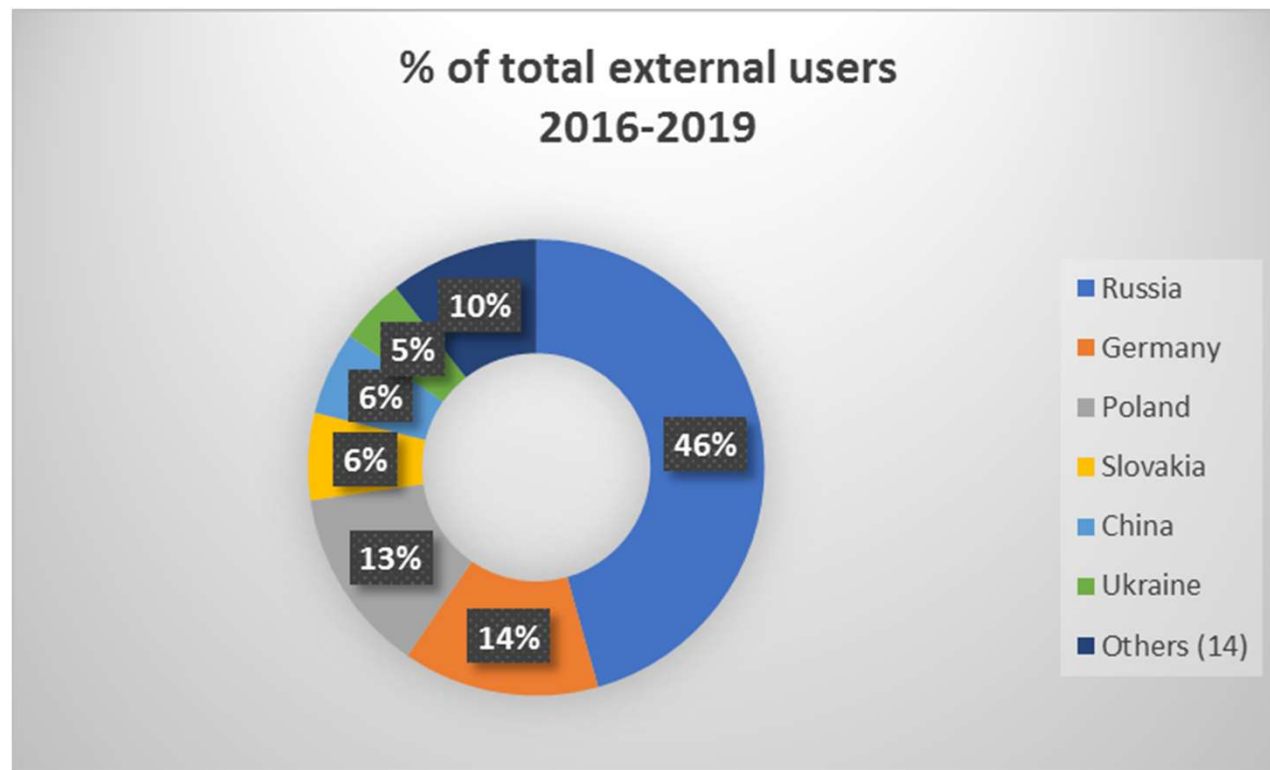
The JINR Visit Centre provides the communication with the Users concerning visa procedure, booking accomodation, transport from Moscow airports to Dubna and back, access on site permition.

**Is there any condition to be respected by User for the use of the facility services?**

The Users must comply with the Russian, local administrative and the JINR safety regulations. A copy of medical certificate confirming that the User's health status allows him to work under radiation conditions. Russian Users have to present with their passport a Tax identification number and an Individual insurance account number.

All Users of IBR-2 instruments are required to publish their results in a timely and responsible manner and to notify the beamline scientist of publications resulting from work conducted there. As well as the beamline scientist accompanies all the time the User at facility and he has a vital role in performing the experiment and raw data processing, the co-authorship of the beamline scientist is also required. IBR-2 infrastructures are to be duly acknowledged in all publications resulting from use of IBR-2 facilities.

- ✚ 6. Please list some general information about the users of the facility (employees of the organization/external users -Russian or foreign, university or research institute or industry-, if foreign – please specify the main affiliation Institutes and the main scientific disciplines).
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## 7. Cooperation with the European RI facilities (visits, exchange of experience, knowledge, etc.) (if no cooperation built yet – indicate the priority RIs for the future cooperation)

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JINR employees are also users at other European RI facilities (ILL, FRM-II, KFKI, ESRF, DESY, PSI, ISIS, etc.)

Mutual visits

Some of our specialists had different positions in European centers like ISIS, FRM-II, HZB

European experts are members of:

FLNP JINR User programme Expert commissions

JINR PAC on Condensed Matters Physics

JINR Scientific Council

or are invited to participate in their activity ex officio

Participation in European conferences and conferences organized in Dubna

Exchange of experience in the field of development of research instrumentation with ESS, ISIS, FRM-II, PSI, KFKI

## 8. Brief analysis of the facility (strengths, prospects for international development)

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### Strengths:

International intergovernmental status of institution with preferential relations with Ministry of Foreign Affairs;

Well developed social infrastructure (own hotel, own cars for picking up the users at the airport, canteens, restaurants etc.);

Large international cooperation;

Relatively close location to Moscow.

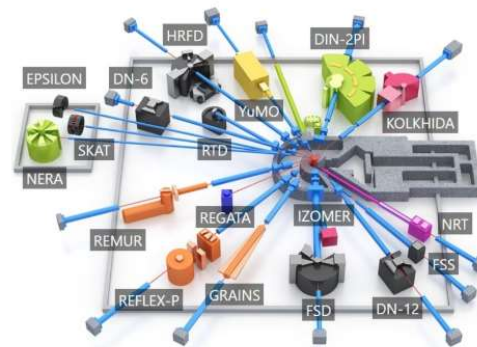
## + 9. Facility website screen shot and link (English version is highly required)

[ibr-2.jinr.ru](http://ibr-2.jinr.ru)



Enter

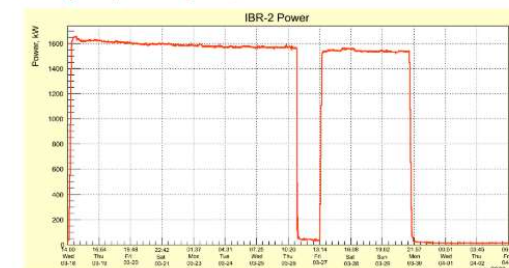
HOME GENERAL INFORMATION DOCUMENTS IMPORTANT DATES FEEDBACK CONTACTS



Work schedule of the IBR-2 reactor in 2020

**IBR-2 Status:** OFF

**Next cycle:** April 13 – April 24, 2020 CANCELLED



### Important information (2020/03/16)

Dear Colleagues,

This is to inform you that in accordance with the order of the JINR Directorate regarding the coronavirus epidemic, we are forced to cancel all international visits to the experiments in FLNP.

We plan to compensate for the lost experimental time in the second half of this year (September-December). Further details will be provided later. We would also like to inform you that in accordance with the order of the FLNP Directorate, we are canceling the nearest round of proposal submission. We plan to open the next round at the turn of August and September 2020.



Frank Laboratory of Neutron Physics (FLNP)  
Official website

### Useful information

- [IBR-2 INSTRUMENTS](#) with the list of REFERENCES and RESPONSIBLE
- [CONFERENCE CMR@IBR-2](#)  
Registration for the CMR@IBR-2 conference, October 12-16, 2020 will be available on the conference website <http://cmr-ibr.jinr.ru> after 15 of May
- [FLNP BOOKLET](#)
- [FLNP USER GUIDE](#)
- [FLNP ANNUAL REPORTS](#)
- [FLNP DNICM LABORATORY EQUIPMENT](#)

Information for RNF grant applicants/Информация для грантозаявителей РНФ

ОБЪЕКТ ИНФРАСТРУКТУРЫ - ИБР-2



## 11. Contact details (name, position, cell phone, e-mail)

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culicov@nf.jinr.ru