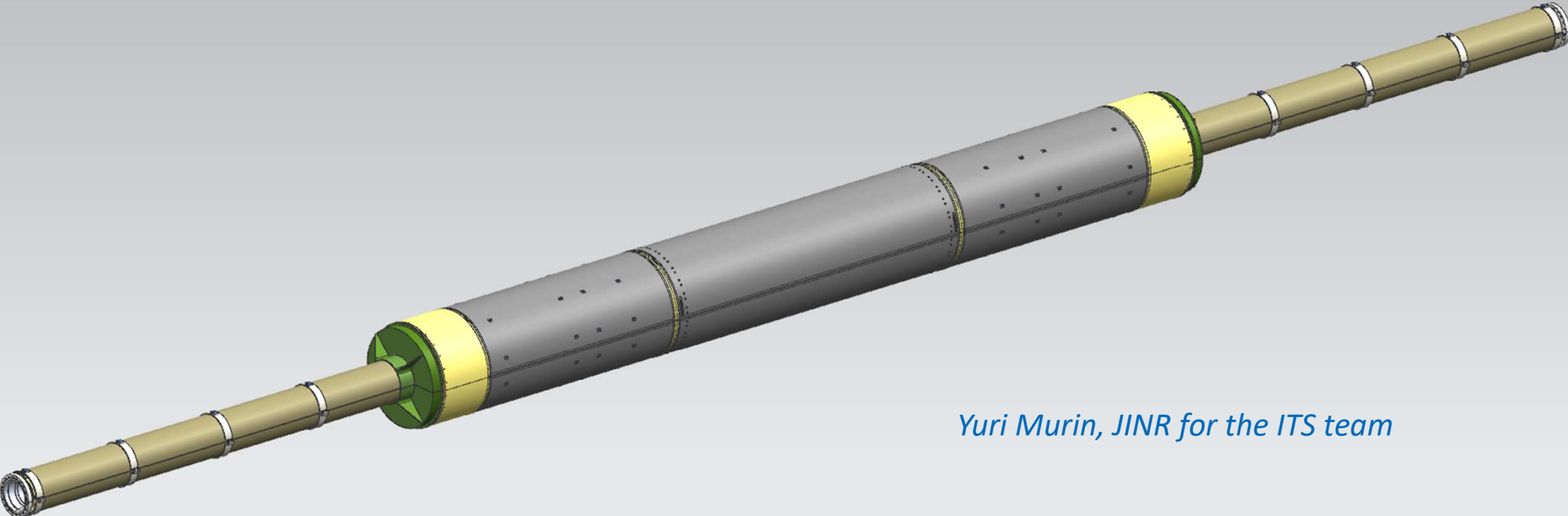




Status of mechanics for the BP, FFD and ITS



Yuri Murin, JINR for the ITS team



Outline

- **Problems with integration of BP with TPC and the IC**
solution to those
- **Scenario of integration of the IC**
- **The MPD ITS in a nutshell**
- **Status of the design and production of essential parts**
- **The IC dry tests plan**
- **Tentative timelines for completion**



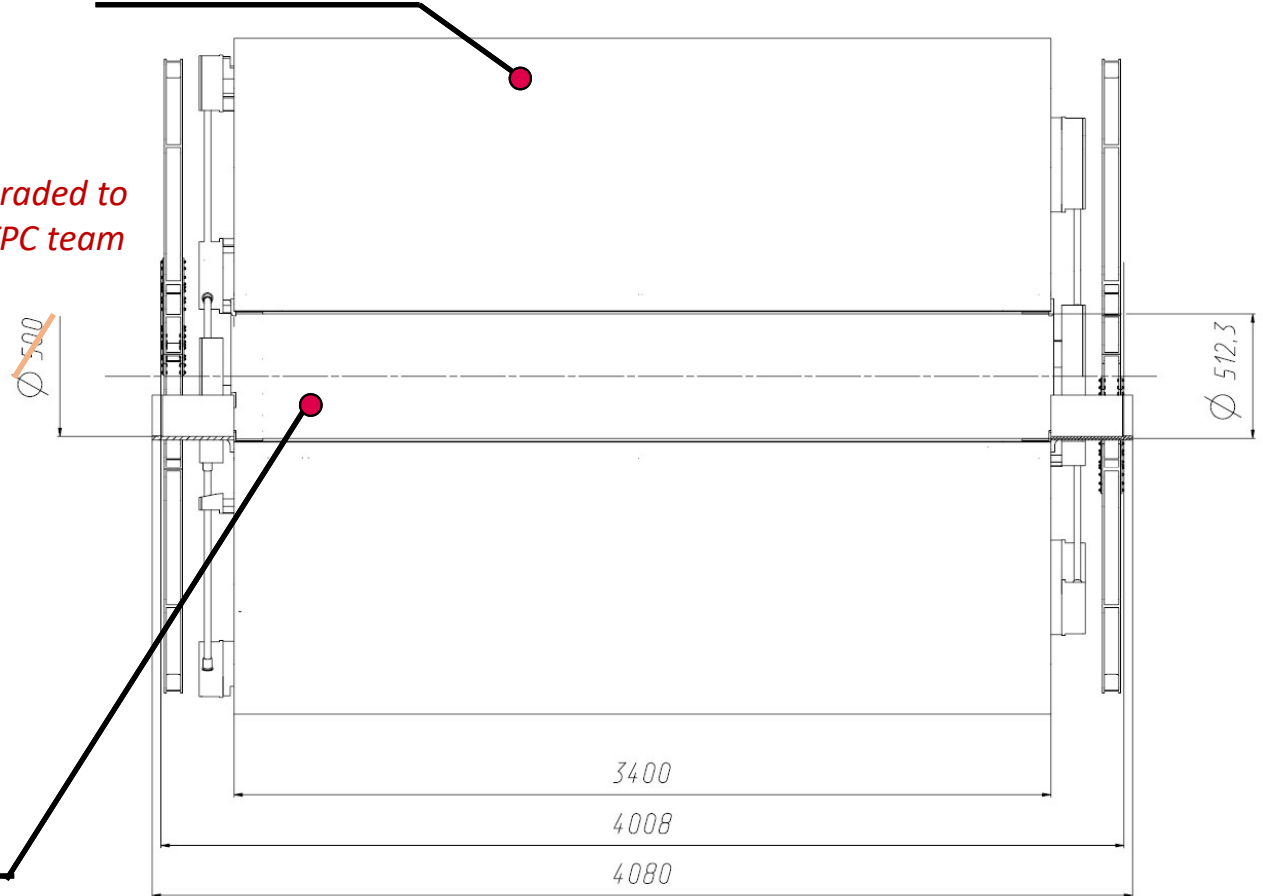
ITS and Beampipe installation challenge

The **clearance** between the ITS installation container in the TPC detector is **only 4.5 mm !**

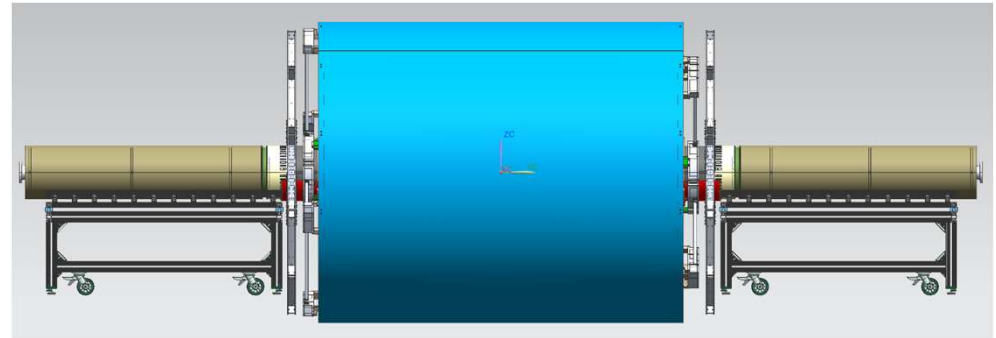
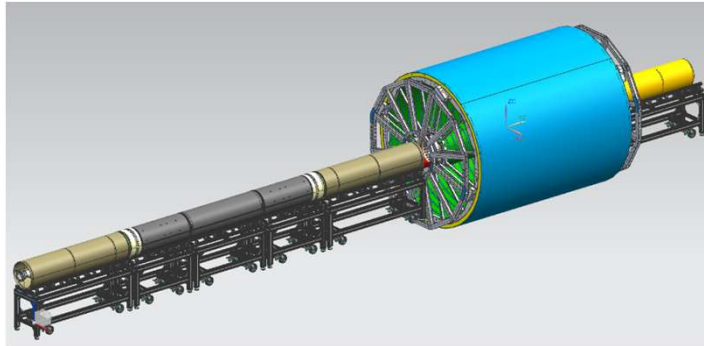
Initial 500 mm diameter was traded to 504 mm with TPC team

TPC bore

The TPC sensitive volume



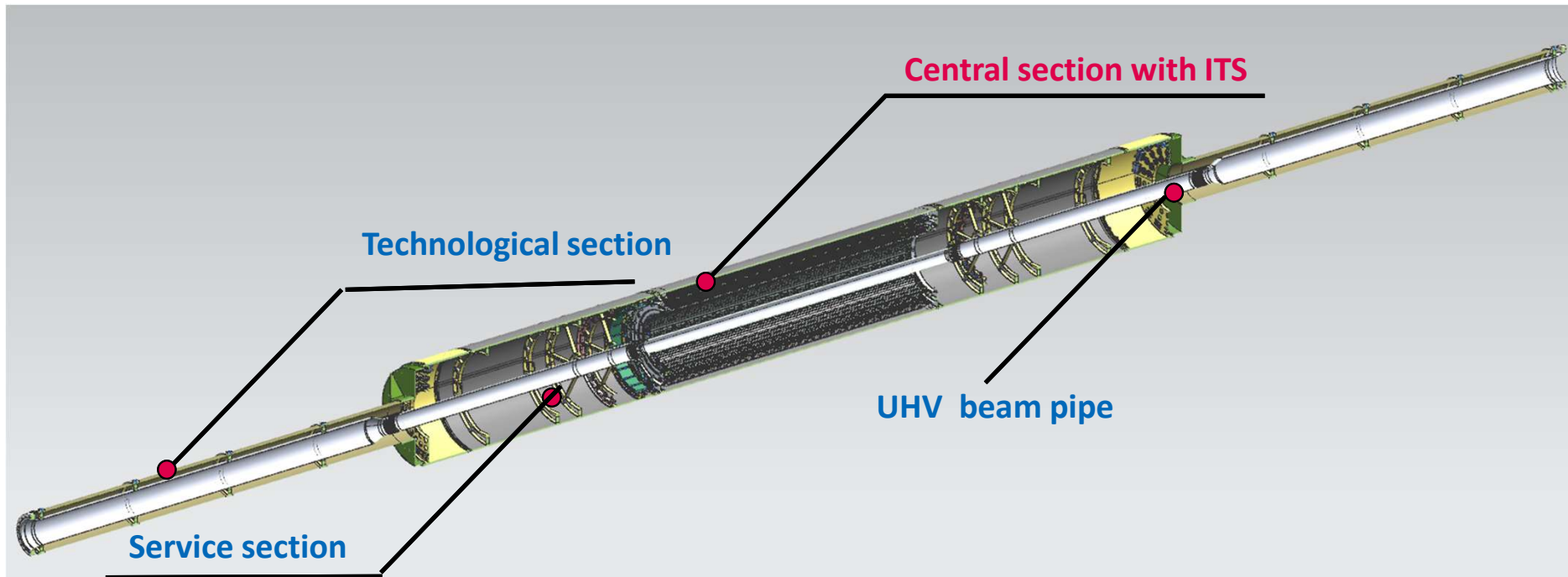
Integration scenario of all TPC inside parts



- Mount preliminary tested BP filled with dry nitrogen, two FFDs and bottom half of the ITS with all cooling arteries and cables into the bottom shell of the IC on auxiliary adjusting tables with rollers;
- Mount the upper part of ITS with its arteries and cables into the upper shell of the IC ;
- Clamp the assembled upper part to the assembled bottom part of the IC;
- Test the functionality of the sensors inside;
- Roll-in the IC into the bore of TPC;
- Give room to vacuum team to connect the BP to the vacuum chamber of the collider.

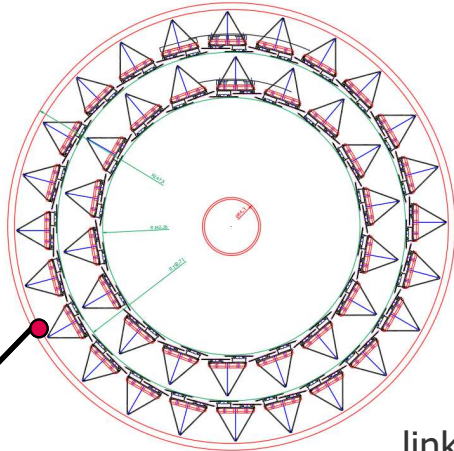
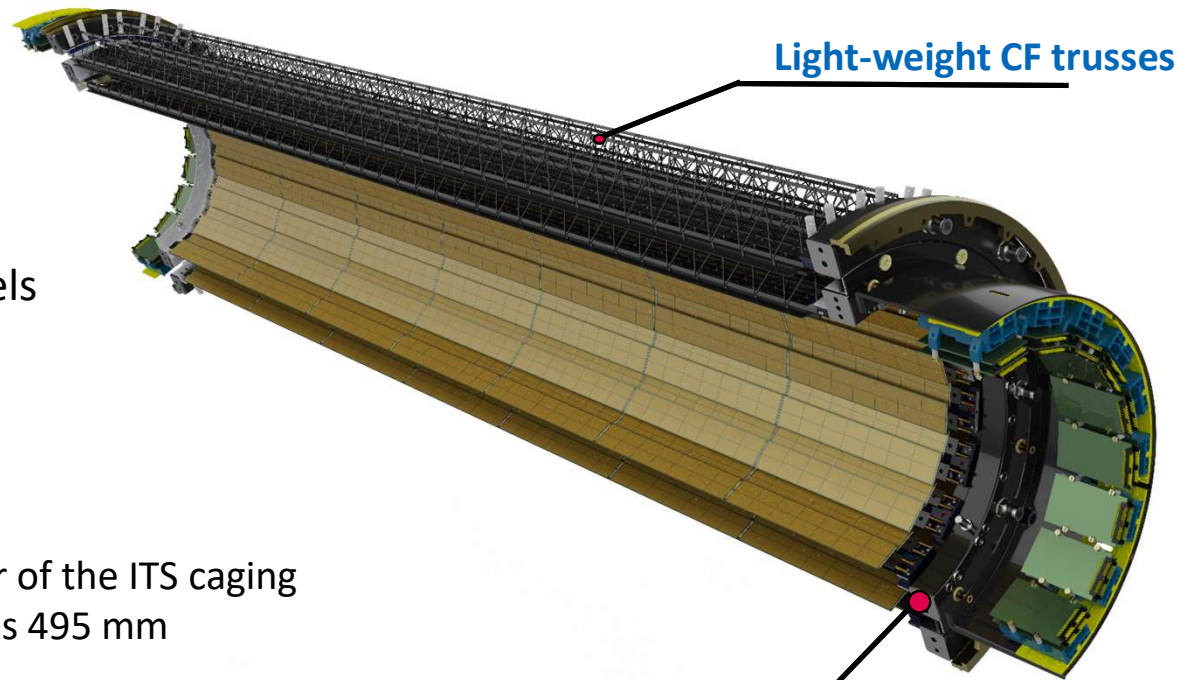


The IC structure with all inside parts of TPC



Central Section: the ITS and beryllium part of the beampipe

- Two Outer Barrel 2 layers composed of 42 staves each carrying 196 ALTAI MAPS of 15x30 mm² size
- Radial position (mm): 145, 195;
- Length in Z: 1475 mm;
- Layer 4: 18 STAVEs / Layer 5: 24 STAVEs
- 8232 MAPS cover 3,7 m² with 4'316B pixels



Diameter of the ITS caging
Is 495 mm

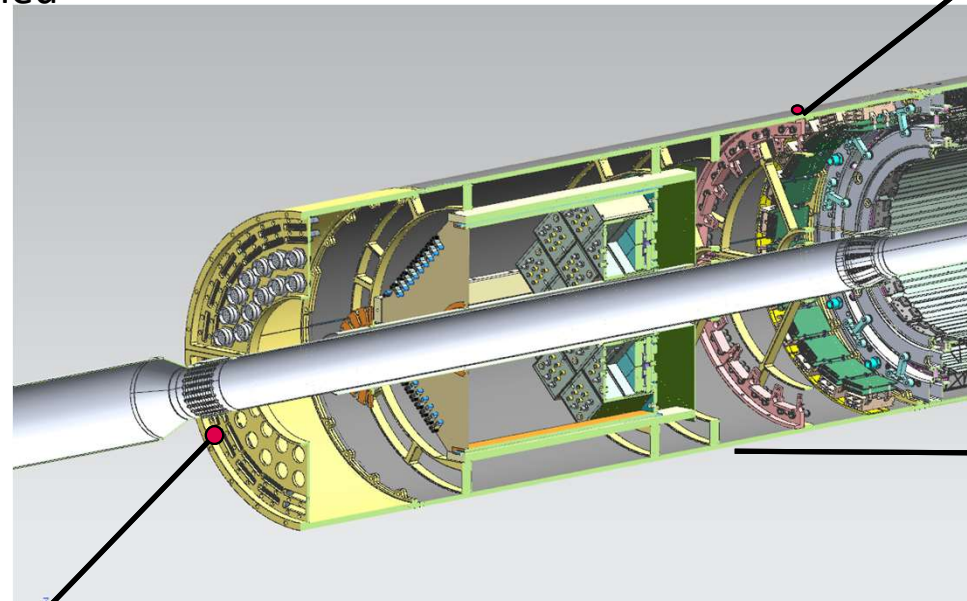
link for the MPD-ITS
TDR: <https://disk.jinr.ru/index.php/s/SgscL93JwxKpoDp>



Service Section: the ITS connectivity parts, FFDs, the beampipe carriers

- Water cooling manifolds (not shown)
- Filter boards for power supply
- Data cables (not)
- FFD with cables attached
- Patch panel

Layer 4: 18 STAVEs / Layer 5: 24 STAVEs
Asymmetric layout



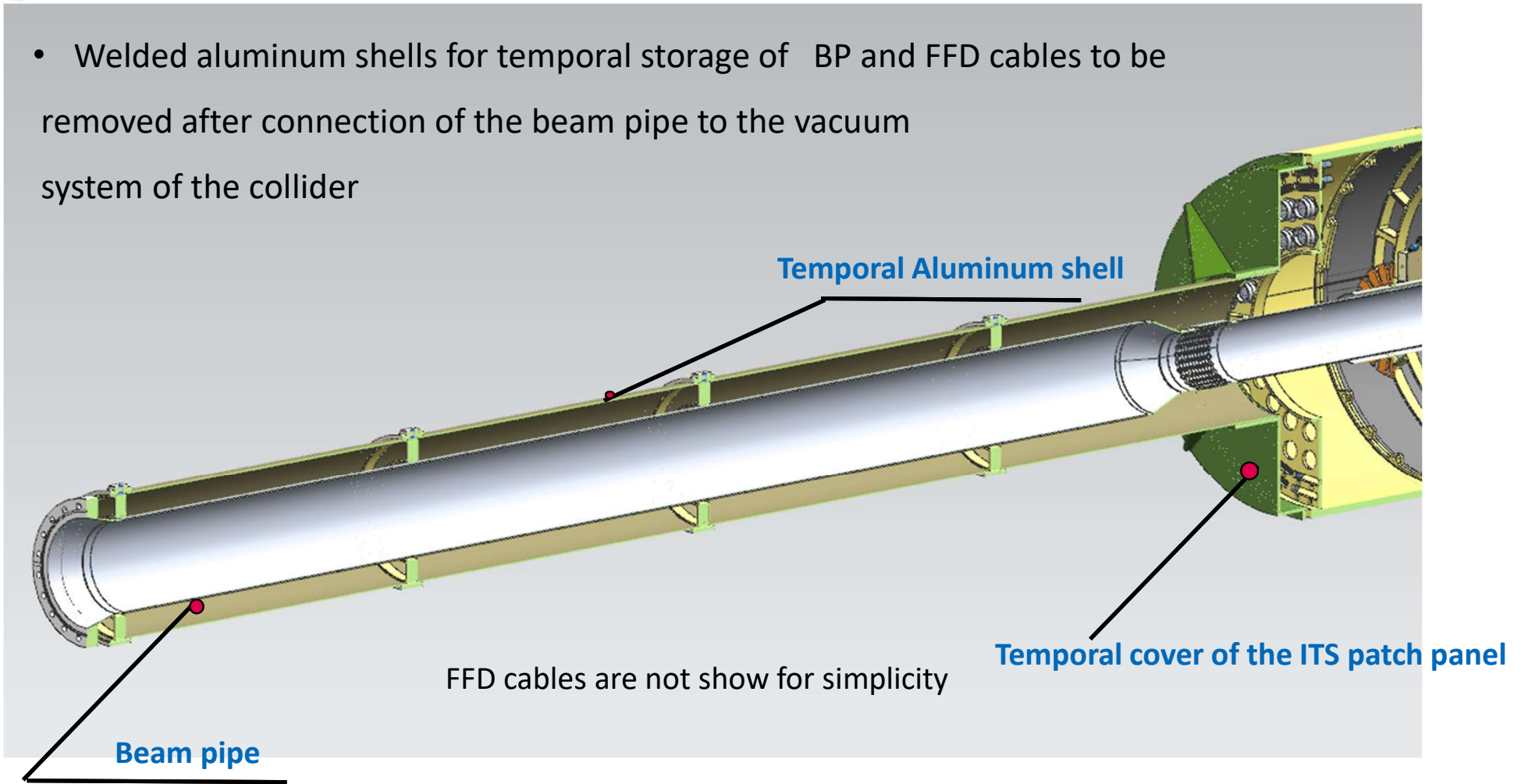
Light-weight CF casing

FFD Carrier

Patch panel

Technological Section: Beampipe Carriers and FFD cables

- Welded aluminum shells for temporal storage of BP and FFD cables to be removed after connection of the beam pipe to the vacuum system of the collider





Status of production of the IC essential parts

- **Central section**
- **Service sections**
- **Technological sections**
- **Auxiliary devices**
- **Infrastructure preparations**
- **Unresolved issues with parts to be designed after installation dry tests**



Central section components (Andreev, Voronin et al. c/o Igolkin)

- **Two thin-wall half-cases:** carbon fiber sandwich with high accuracy embedded elements for positioning production



Production on-going

- **Four end-wheels:** carbon-fiber hollow half-ring shape acting as a manifold for gas system; high accuracy for positioning of support trusses

Production on-going

- **Support trusses and cold plates major work pieces:** carry the sensors; join the end-wheels on opposite sides together

Production completed



- **Auxiliary equipment:** numerous for production and assembly



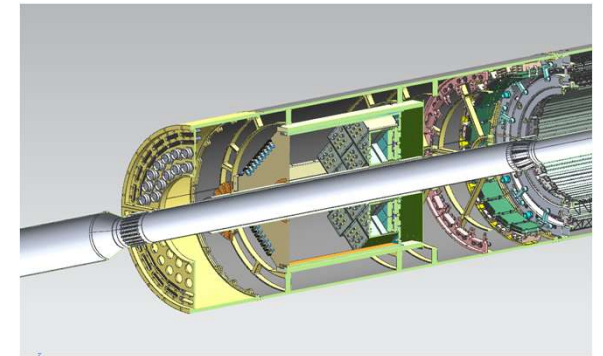
- **Infrastructure preparations:** workshop for CF parts lamination and large area hall for pre-assembling of the IC

Production completed



Service sections

- Two CF and Two Al half-shells
- ITS cooling arteries with manifolds and fixtures
- ITS power and data cables with filter and fixtures
- Two punch panels with ITS power and data connectors
- OBS! **Beam pipe supports**
- Two heavy FFDs with power and data cables and **BP carriers**

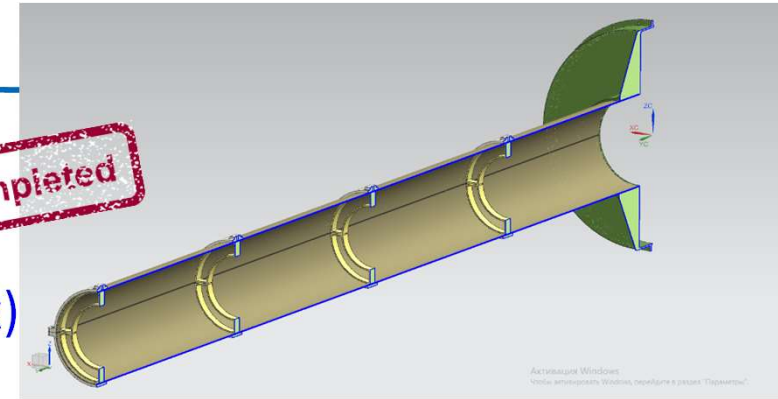


Design on-going



Technological sections

- **Four Al half-shells** (to be dismantled after BP fix)
- **Four BP supports** (to be dismantled after BP fix)
- **Pieces of FFDs power and data cables** (to be rearranged during the Al half-shells dismantling)
- **Auxiliary jigs and fixtures for dismantling** (together with vacuum team)

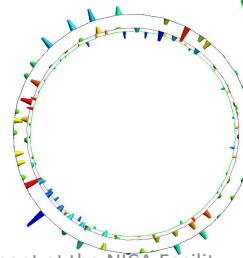




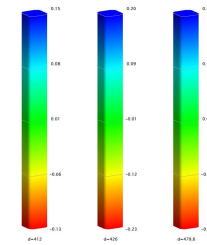
Installation plan: pre-assembling (Bld.216) & dry tests (SPD Hall?)

- Request for large area halls for pre-assembling and **dry tests**
- Adjustable roll-in tables for squeezing the IC into the TPC bore **Production completed**
- Test tables for Bottom Half-IC **Production completed**
- TPC bore mock-up (E.Serockin et al) **Production completed**
- Auxiliary jigs and fixtures for clamping IC halves **Design on-going**
- Metrology support (Y.Tsvetkova) **Production on-going**

Production on-going



Design on-going

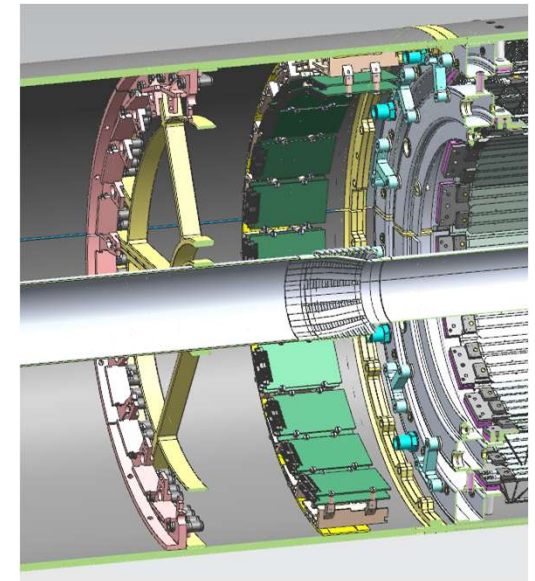




Status and tentative time lines



➤ **Urgent request for the beam pipe technical specification with reasons in the picture!**





Thanks to our external partners and the audience

- **SPbSU** (V.Zherebchevsky et al.) for production of 60 ultralight trusses work pieces
- **Mezon Ltd (SPb)** for production of molds for lamination of trusses and machining the end-wheels work pieces
- **Euromec, (Modena) and MELZ Ltd(Zaprudnja)** for production of high accuracy jigs and parts for the ITS assembling
- **Sergey Igolkin (SPb)** for the basic design and numerous consultations