

# MRI scanner development in Russia

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**MT25**

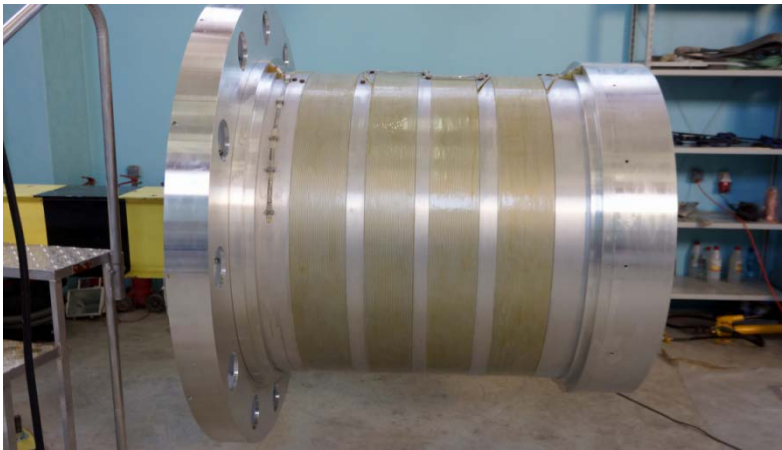
### Lebedev Physical Institute Russian Academy of Sciences:



Lebedev is  
largest Russian Institute in physics:  
1600 staff altogether;  
800 researchers,  
7 Nobel prize winners,  
Highest Russian citation indexes  
Laser invention (Basov, Prokhorov)

# MRI scanner development in Russia

2015



## Superconducting Magnet:

Field Strength

1.5 T

RT Bore Diameter

900 mm

Rough field homogeneity in 450 mm DSV

700 ppm (peak to peak)

Active Shielding:

0.5 mT Line Distance from Center

2.6 radial / 4.6 m axial

Field Stability

0.2 ppm/h or better

Zero Boil-off Helium Cryostat

Coldhead

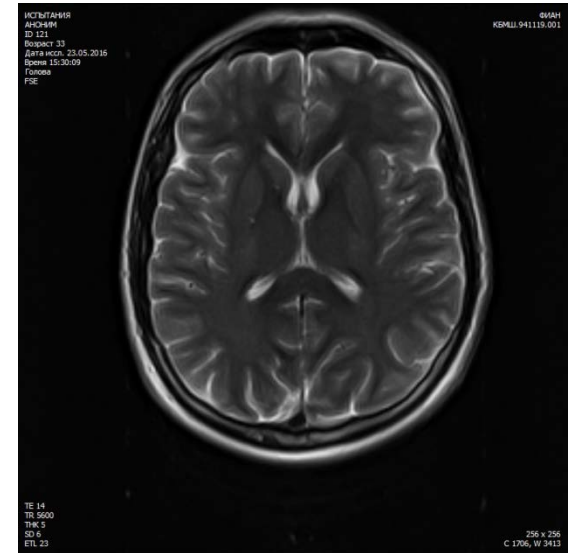
Sumitomo RDK-408D2

Dimensions (WxDxH)

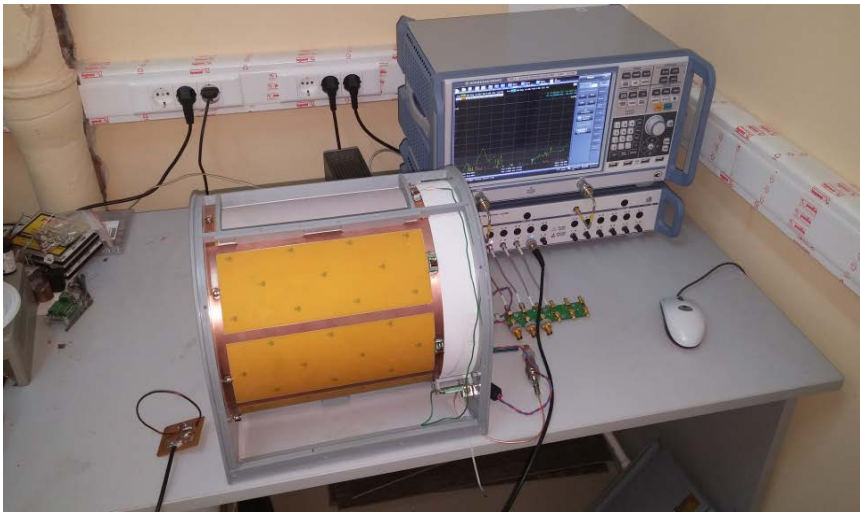
1980x1700x2440 mm

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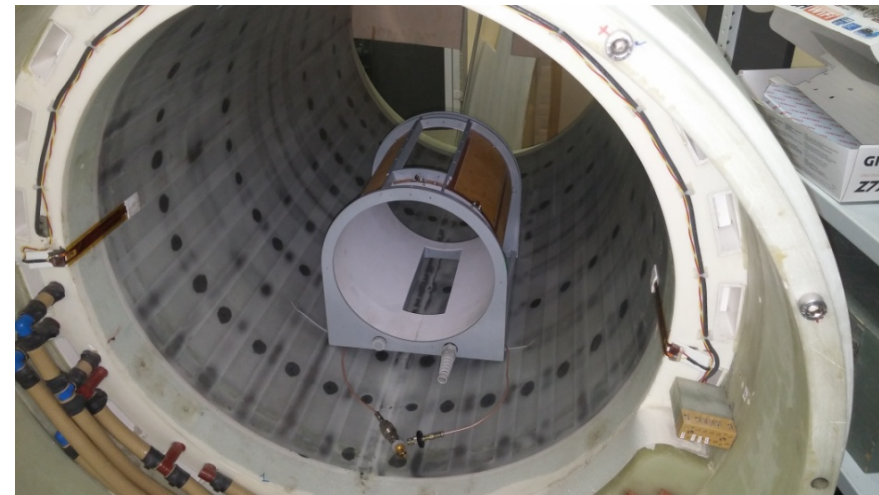
2017



## Testing of head coil



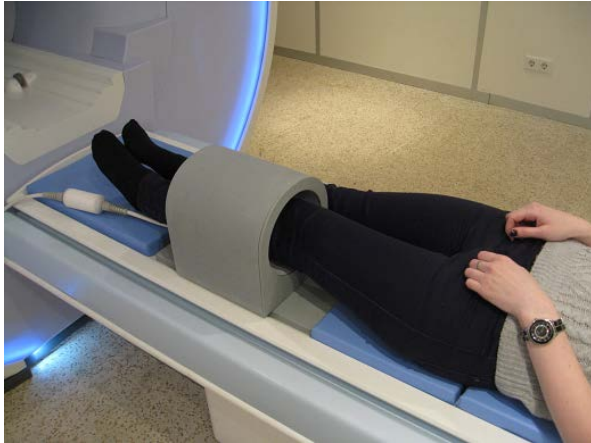
On a laboratory stand



In a gradient module

# MRI scanner development in Russia

Knee coil



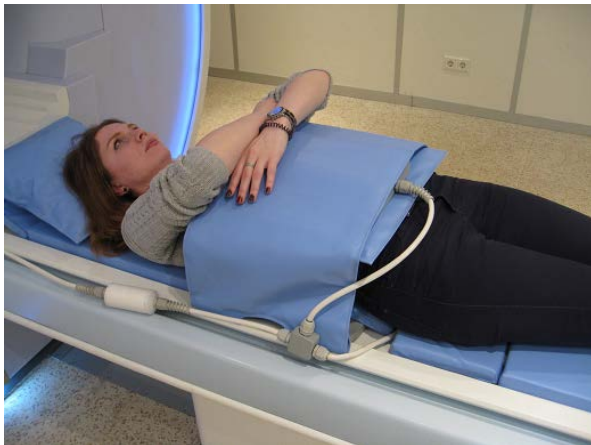
Shoulder coil



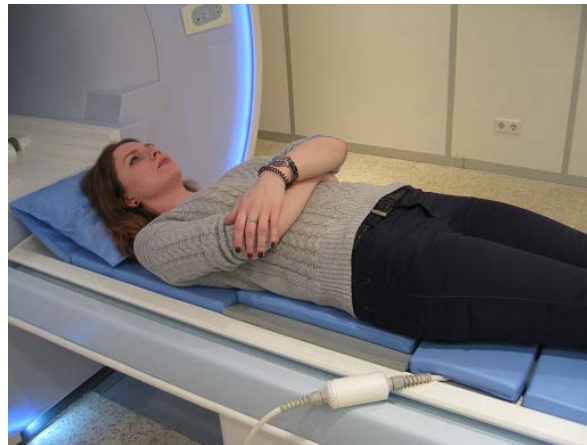
Neck coil



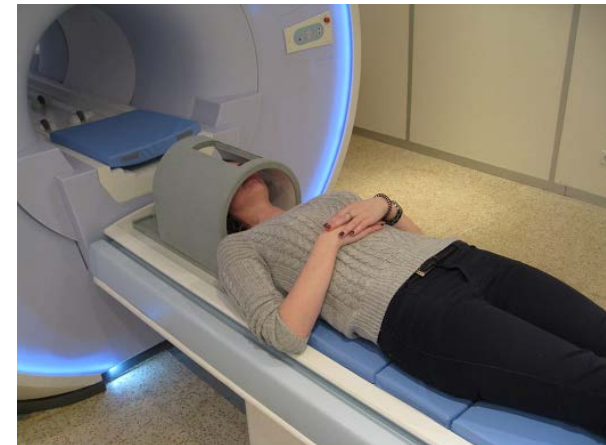
Body coil



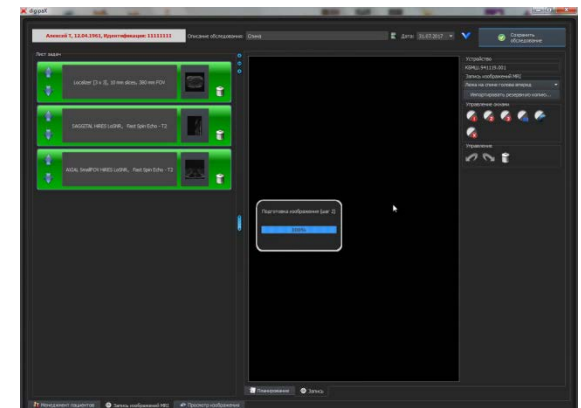
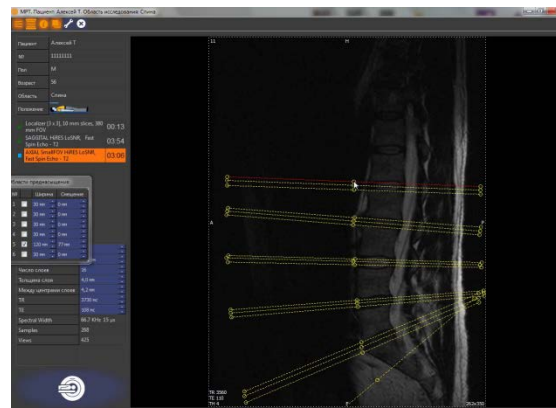
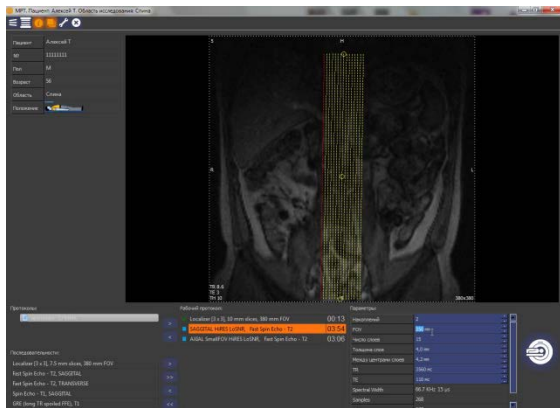
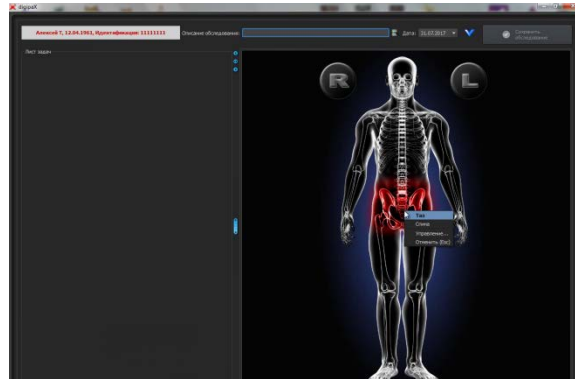
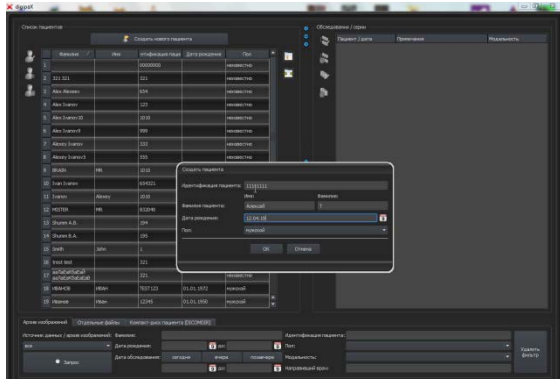
Spine coil



Head coil



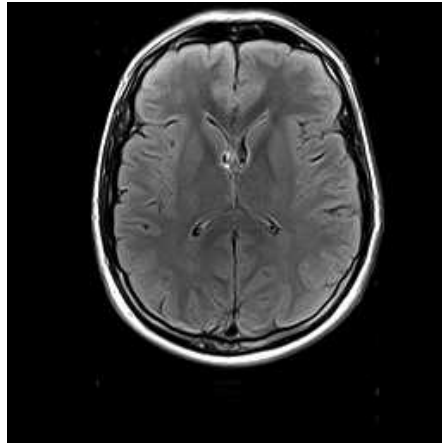
# MRI scanner development in Russia



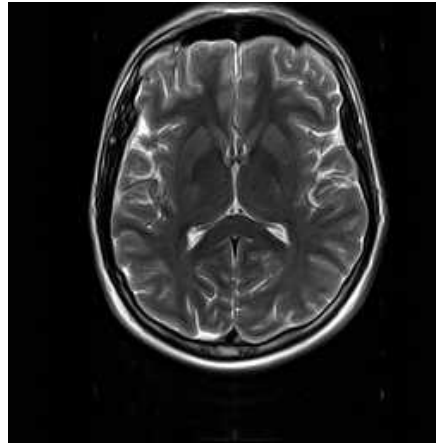
Software includes PACS, image improvement and processing system

# MRI scanner development in Russia

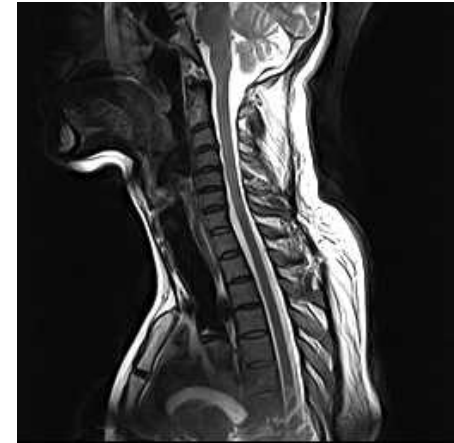
Brain (FLAIR)



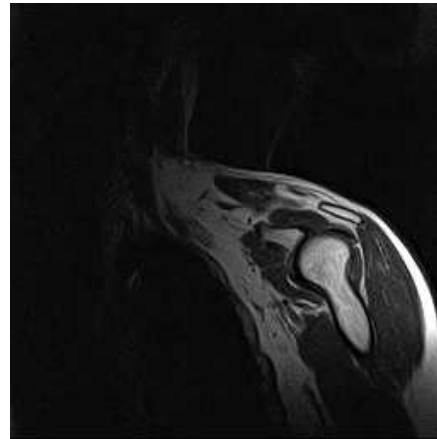
Brain (T2 FSE)



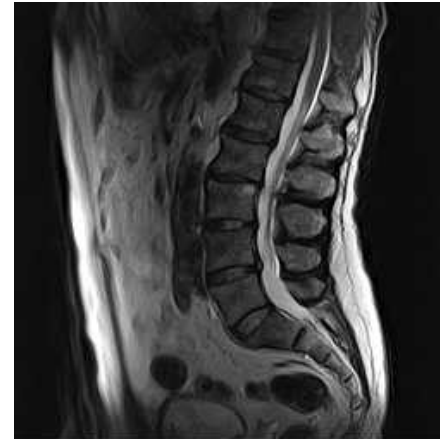
Neck (FSE)



Shoulder (SE)



Spine (FSE)



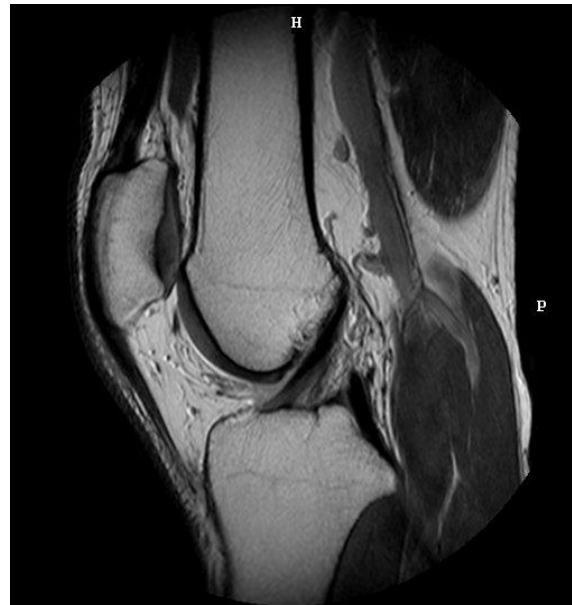


## Full body MRI 1.5T



- ready for production
- own software, magnet and Russian components 60% now (in future up to 85%)
- medical registration in progress
- site for production is being chosen
- search for investors in progress

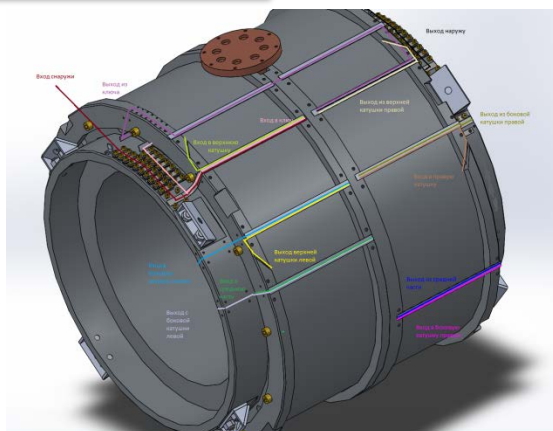
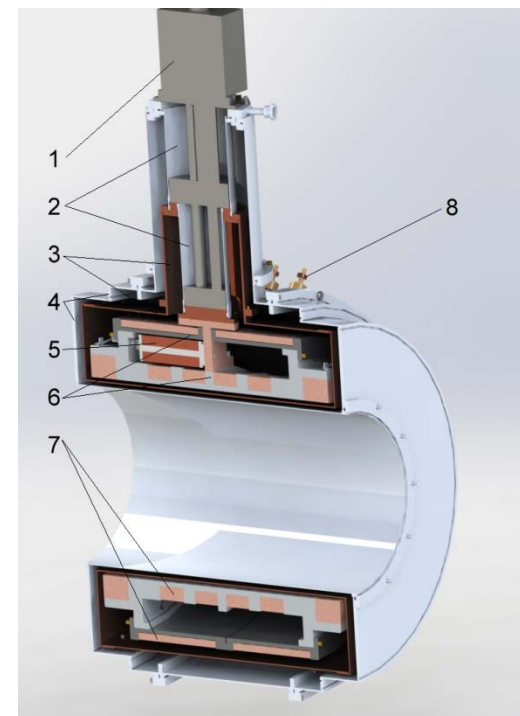
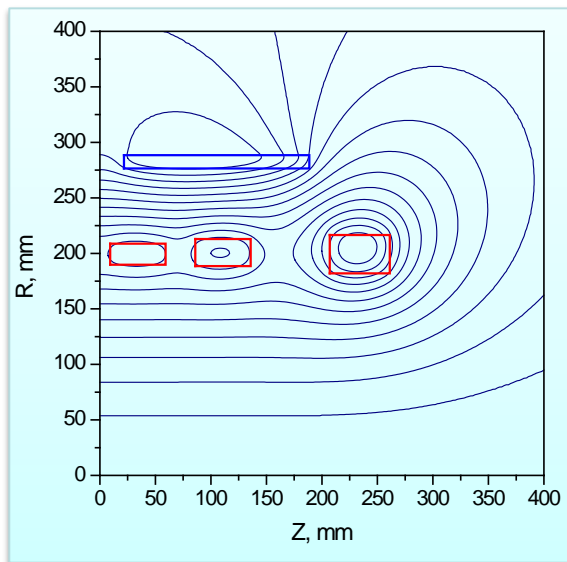
## Helium-free MRI for extremities



## Main parameters of magnet

<b>Superconducting magnet 1.5T</b>	
Diameter of tunnel	325 mm
Length of tunnel	600 mm
Shielding	Active
0,5 mT line from centre distance	2,5 x 1,7 m (Z x R)
<b>Gradient system:</b>	
Patient access diameter	220 mm
Gradient coils X, Y, Z	Passive shielded
Gradient strenght	30 mT/m
Gradient system cooling	Water-cooled
Field correction	System of passive shimming

## Design of magnet



- 1 – cryocooler
- 2 – heat exchange camera
- 3 – radiation screen
- 4 – vacuum casing
- 5 – superconducting switch
- 6 – frame
- 7 – superconducting coils
- 8 – HTSC current leads

### Current state

- Basic MRI technology including Software for MRI device is developed;
- Prototype Production Line with production capacity of 5 MRI scanners/year is developed and installed;
  - Several prototypes built;
  - Qualified team of 60 engineers and workers;
- Readiness to start serial production, safety, pre-clinical and clinical tests, registration of medical device procedures
  - Helium-free MRI technology is being developed

### Goals and future plans

- Further research and development works are in progress on projects of :
  - 1,5T helium-free full scale MRI;
  - 3T full scale MRI
  - production set-up for current 1.5T MRI

**THANKS FOR YOUR ATTENTION!**

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**Demonstration room: Moscow, Leninski  
prospect, 53**