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# **RAZREZ system for RADIOSCRAFT experiment**

**WRMISS 14  
Dublin, 2009**



# The start point: Spacesuit as spacecraft

*Lifetime:* up to 6 month

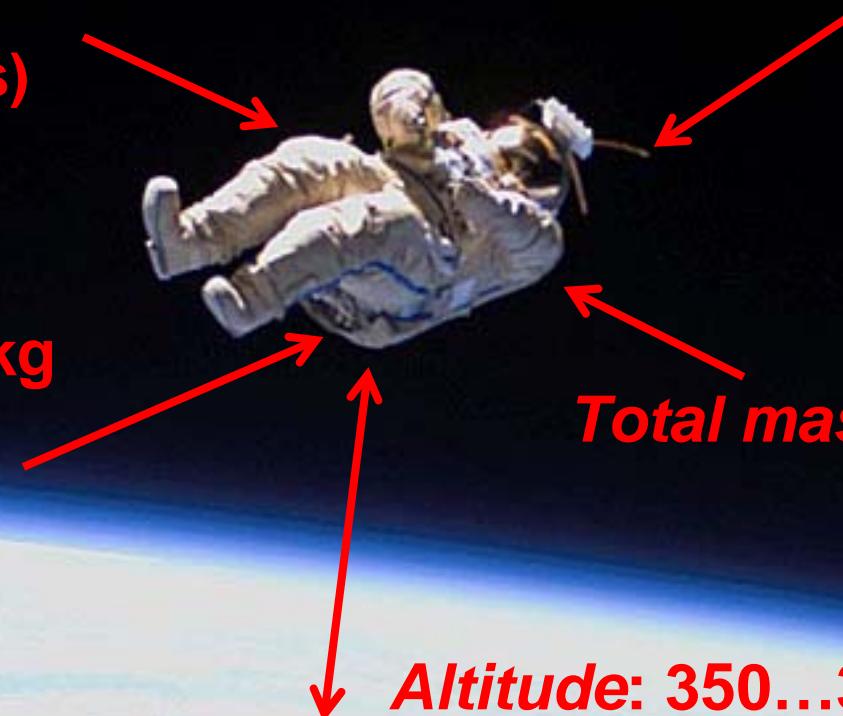
*Power:* up to 20 W  
(chemical +  
solar batteries)

*Telemetry:* 145 MHz,  
up to 4 Mb per day

*Payload:* 17 kg  
(protons,  
electrons,  
neutrons,  
 $\gamma$ -rays,  
dosimetry,  
temperature)

*Total mass:* 150 kg

*Altitude:* 350...380 km  
down to atmosphere





НИИЯФ  
МГУ

## Progress cargo spaceship:

- **3 launches**;
- up to **100 W** power supply;
- up to **100 Mbod** telemetry;
- up to **3 months** lifetime;
- active **altitude** stabilization;
- **one-axis** orientation;
- **telescopic** platform;
- great **total mass** increase;
- great **payload** increase

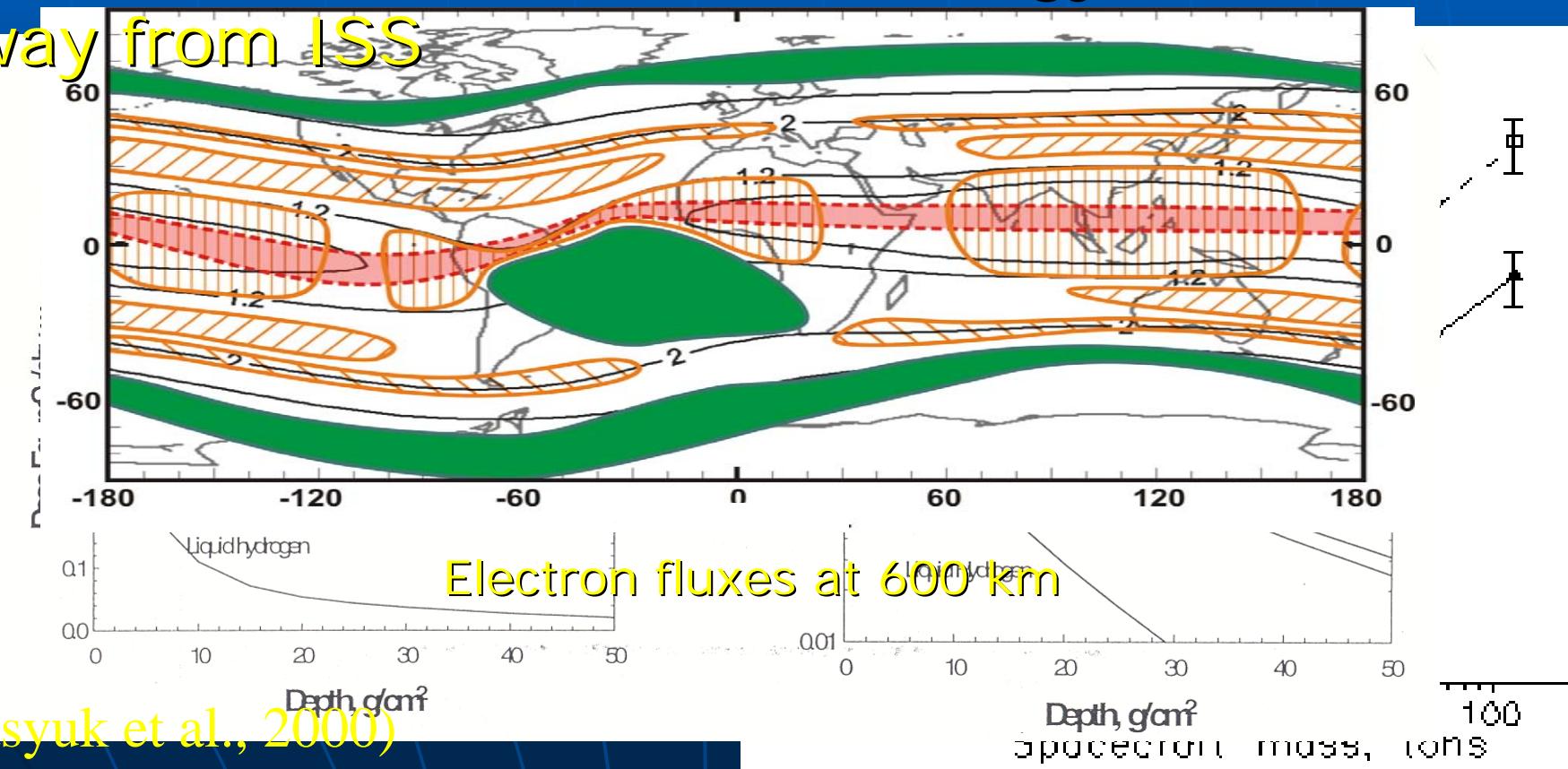
Now we have:





# Main scientific goals:

- Measurement of ~~electrons, protons, ions, gamma~~  
electrons, protons, ions, gamma,  
radiation belts, magnetic field  
amplitudes, the B350 peak and small-energy neutrons  
away from ISS





# RAZREZ payload

## Scientific equipment:

R-B

- **base block**  
(controllers, protons,  
neutrons, electrons,  
gamma)

R-N

- **neutron block**

R-DB1

- **DOSTEL dosimeter**

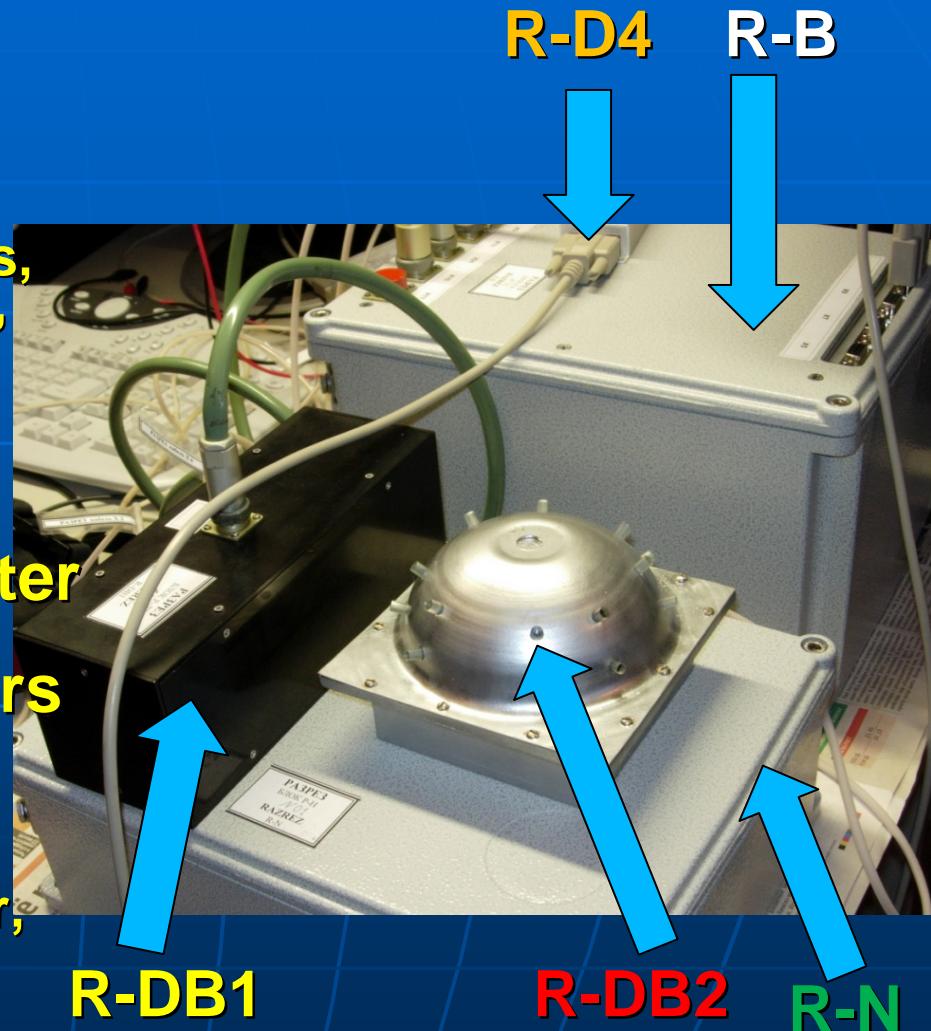
R-D1...D4

- **LIULIN dosimeters**

R-DB2

- **electron block**  
(electrons,  
temperature sensor,  
photo detector)

Temperature sensors



Engineering kit



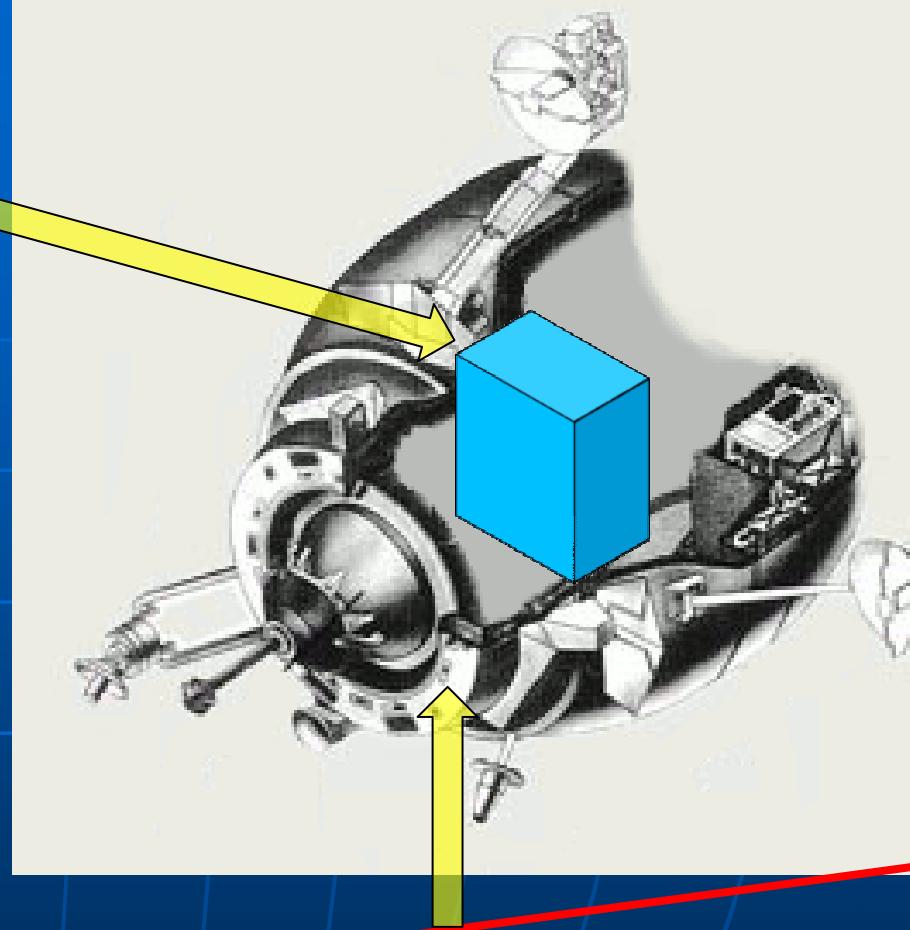
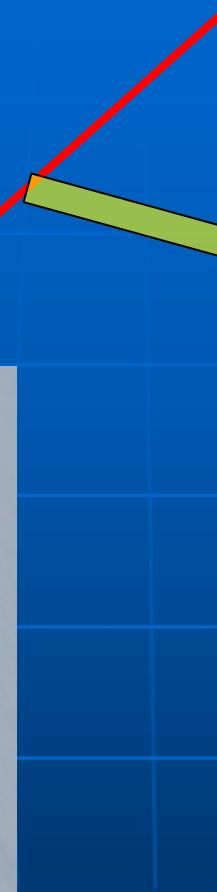
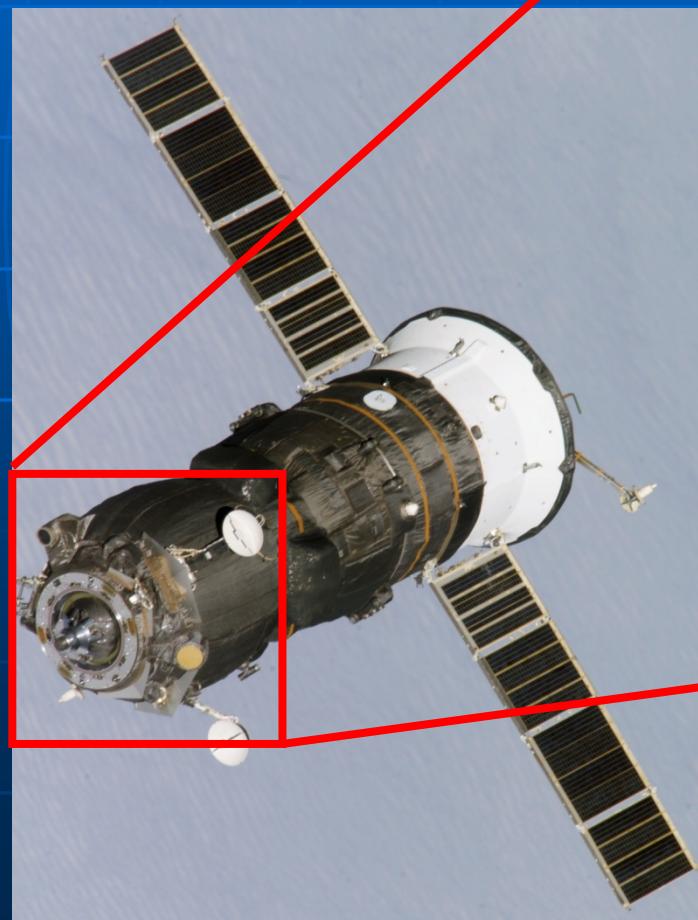
# RAZREZ payload

<b>Neutrons</b>	0.1 eV ... 1.9 MeV, > 2-3 MeV, > 10-20 MeV
<b>Protons</b>	> 50 MeV
<b>Electrons</b>	200 keV ... 3 MeV, spectrum
<b>Gamma</b>	>100 keV, >300 keV, >500 keV, >1 MeV, >2 MeV
<b>Dosimetry</b>	<b>LET</b> 0.1 ... 200 keV/mkm <b>Nucleus</b> Z: 1 ... 26 <b>Absorbed dose</b> 0.09 nGr ... 1.5 mkGr
<b>Surface temperature</b>	-120°C ... +150°C



# RAZREZ payload

RAZREZ equipment



Telescopic  
platform



# Schedule:

**1<sup>st</sup> launch:** **2010**

Neutron measurement, dosimetry,  
rough electron spectrum

**2<sup>nd</sup> launch:** **appr. end of 2011**

Fine charged particles measurements

**3<sup>rd</sup> launch:** **2012 ... 2013**

Waves + fields + charged particles



# Acknowledgments

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- **... , Bulgaria**
- **University of Kiel, Germany**



Thank You!

