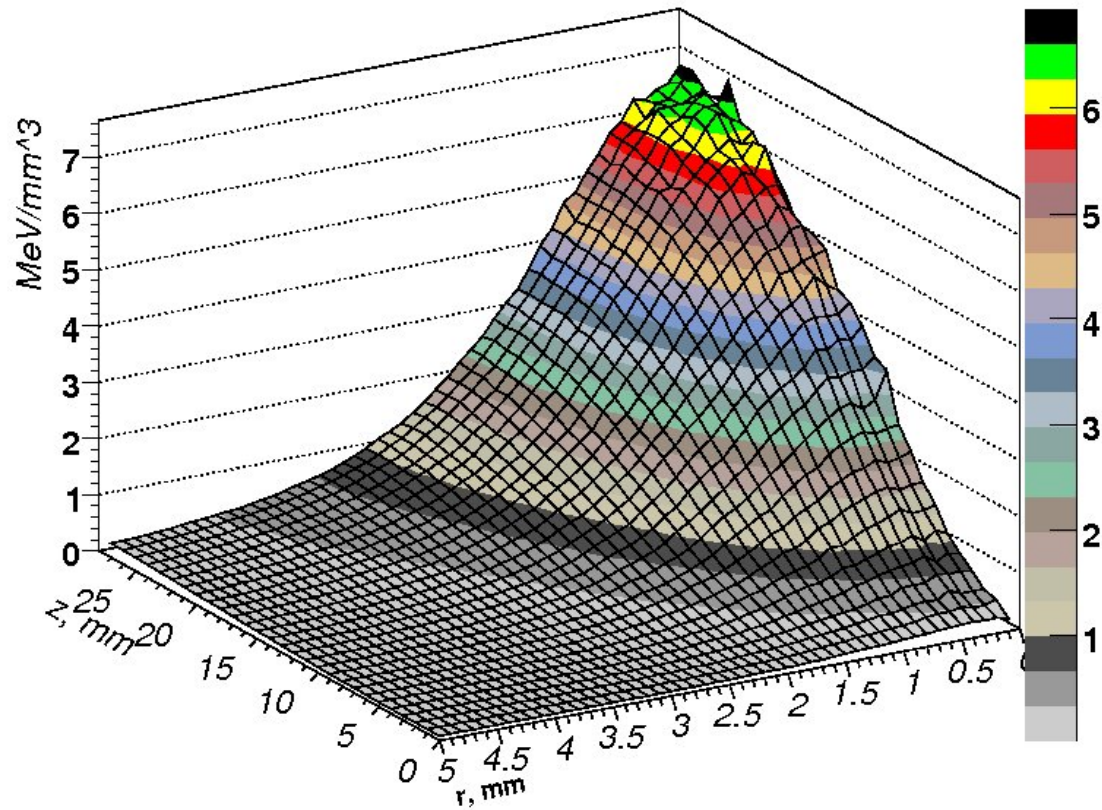# The use of a liquid metal target as a source of positrons

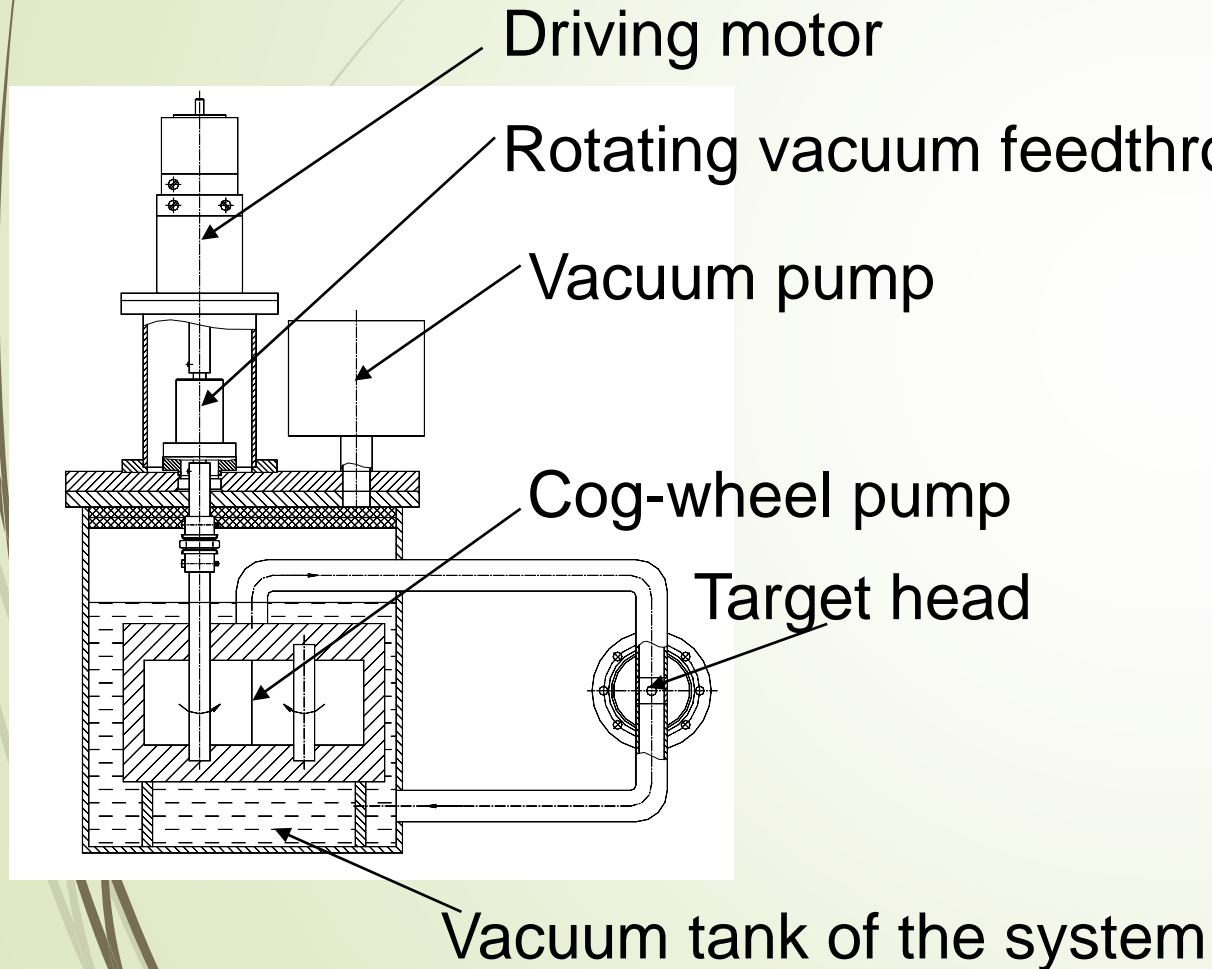Rusinov Konstantin

BINP Russia

Modeling the conversion process in the GEANT4 program



Power density of energy release by electrons.
ILC beam simulation : 5Hz, 2820 bunches per 1 ms. Peak power density $330\ kW/mm^3$, E=6GeV

Getting positrons with solid targets today

Driving motor

Rotating vacuum feedthrough

Vacuum pump

Cog-wheel pump

Target head
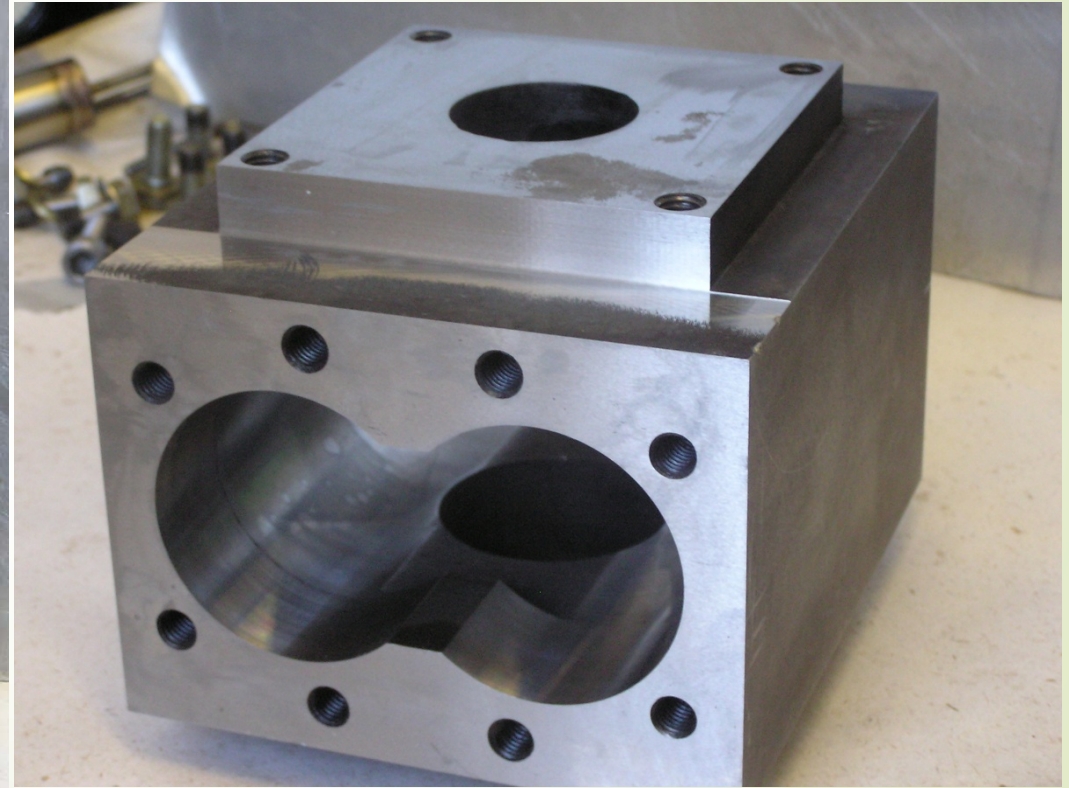
Vacuum tank of the system

Limit values of power density for a solid metal positron target $\rho = NE/\pi\delta^2 = 2 \cdot 10^{12} GeV/mm^2$
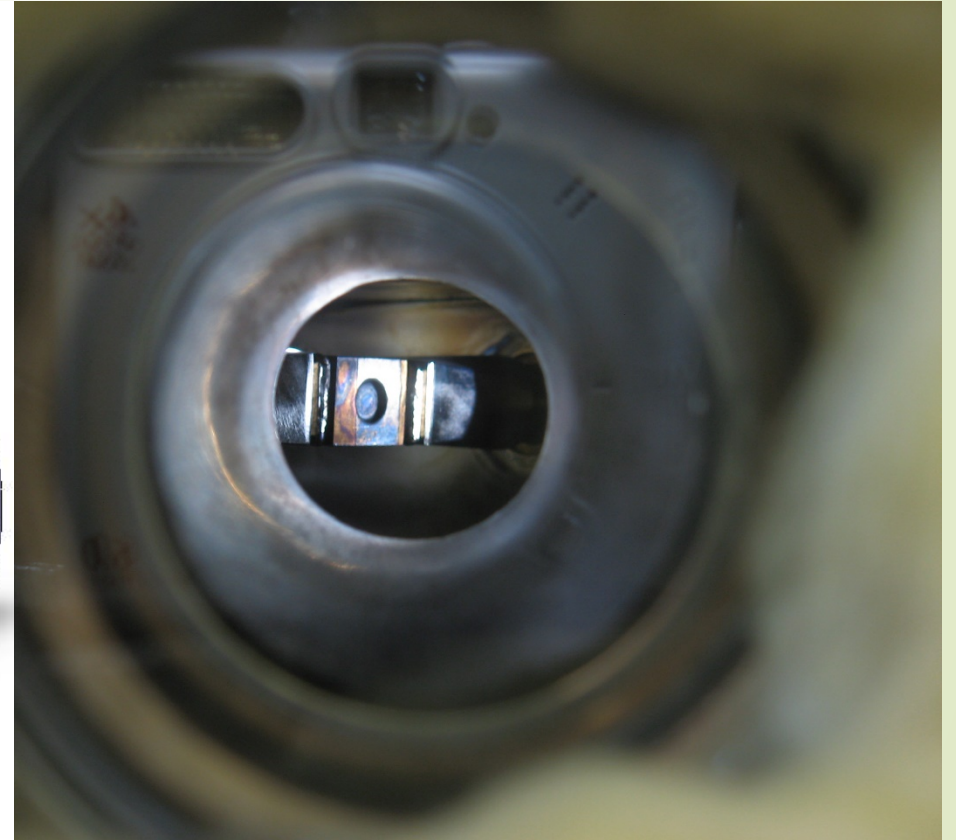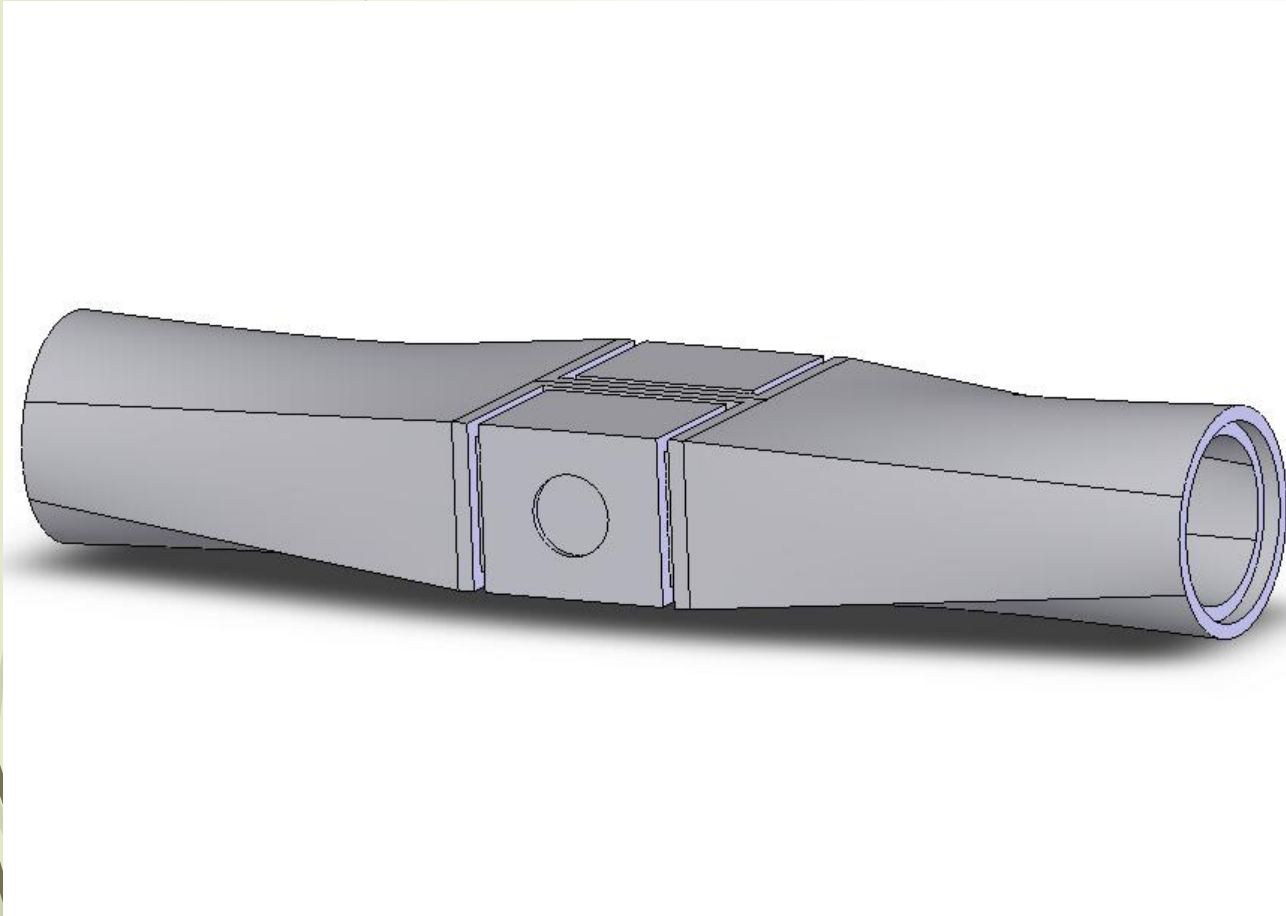
The assembled stand at INP SB RAS
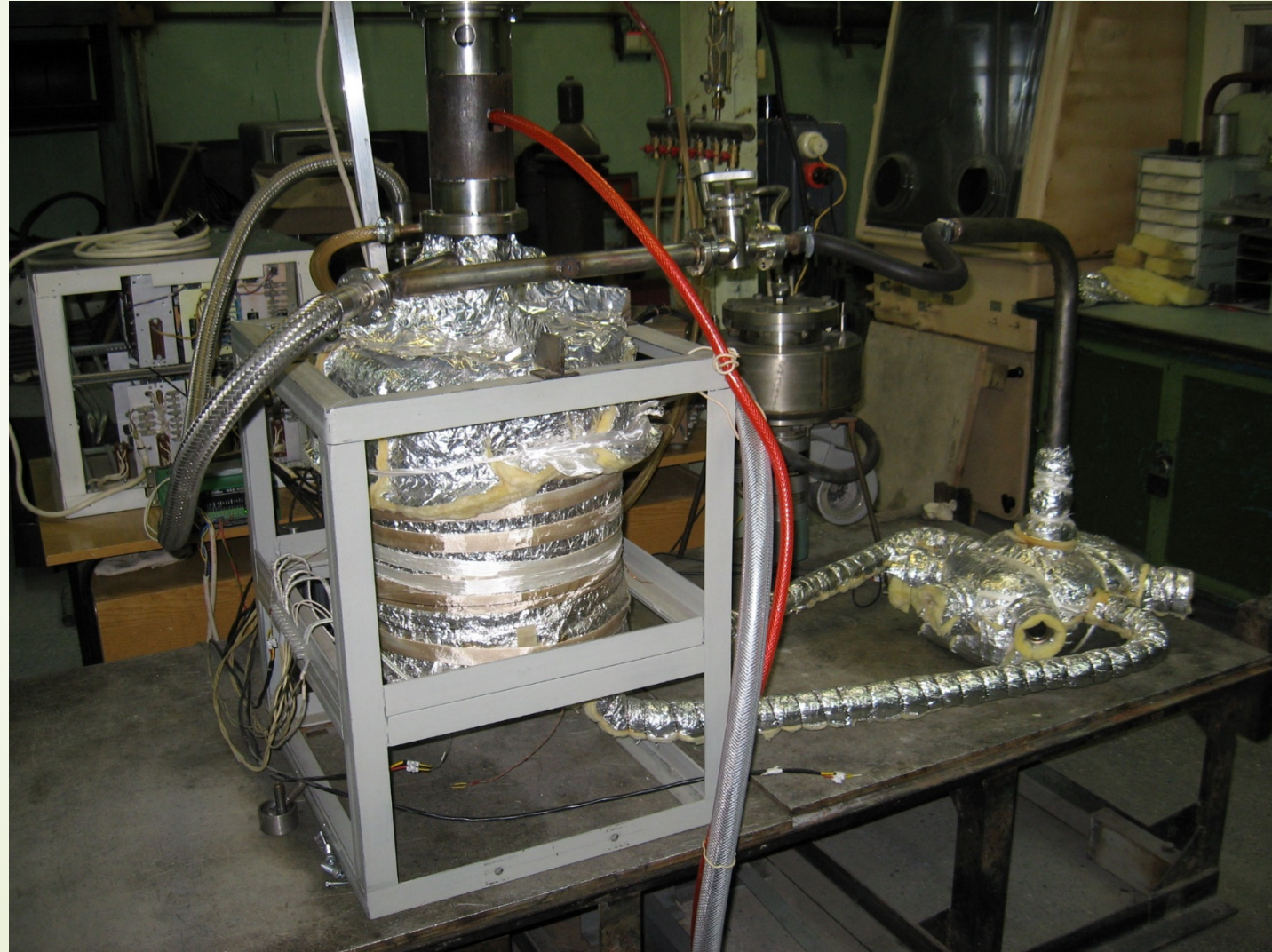
Stand components

Ceramic window and Kovar alloy shape

Ceramic window

The size of the ceramic window is 12 mm in diameter and 4 mm in thickness. Composition ceramics BN
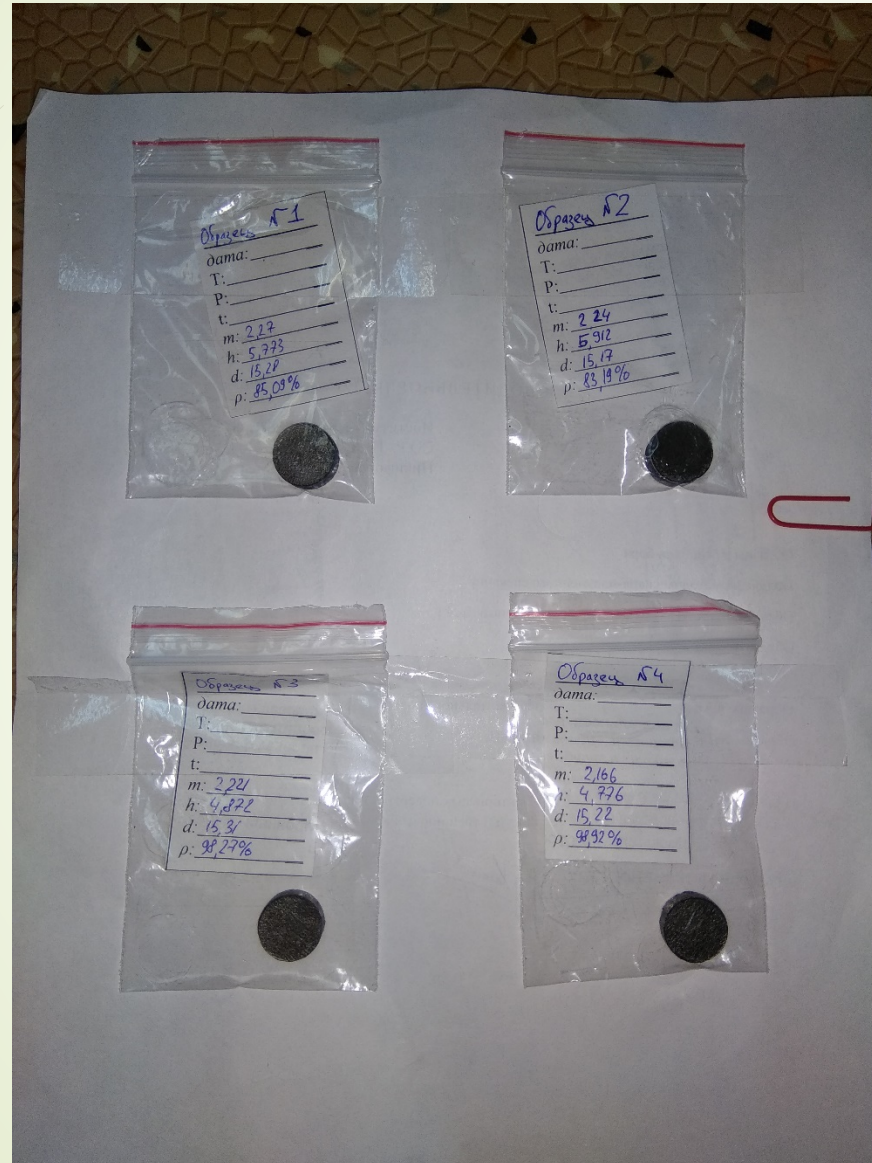
Solder for soldering kovar and ceramics
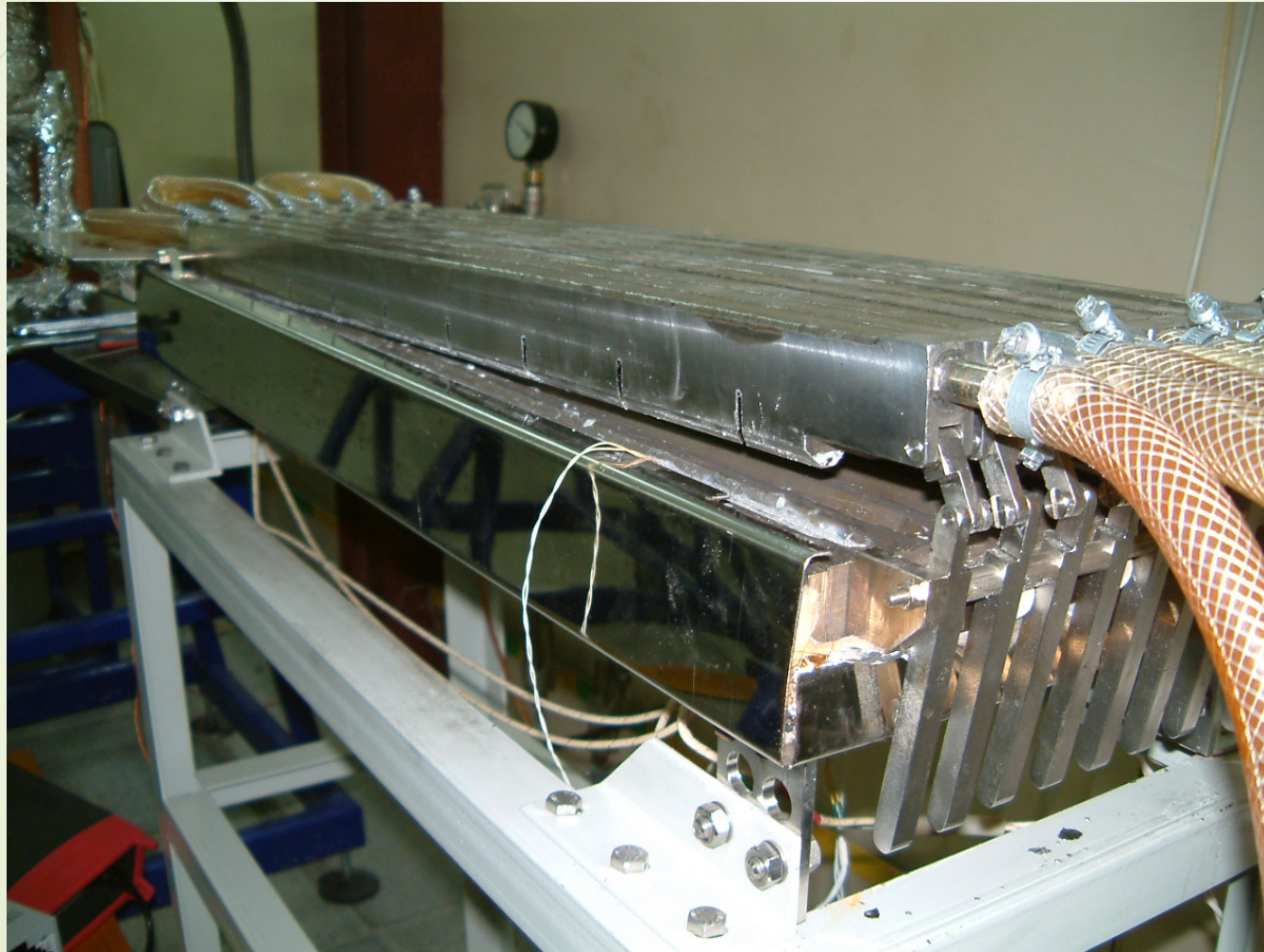

composition of brazing alloy:
Cu 80 % Ti 15 % Sn 5%

New window

we plan to test several new ceramic windows which were manufactured in Tomsk Polytechnic University
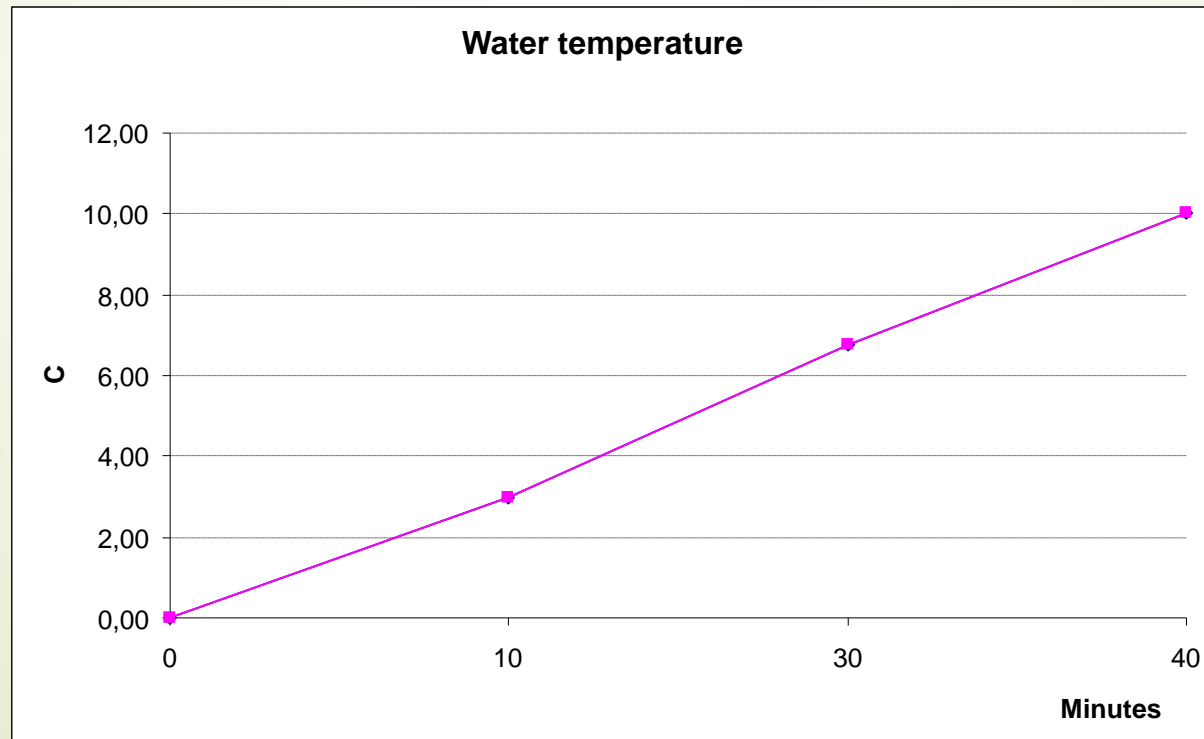
Cooling system

If there is a need for cooling there is a cooling system

Cooling system for one section

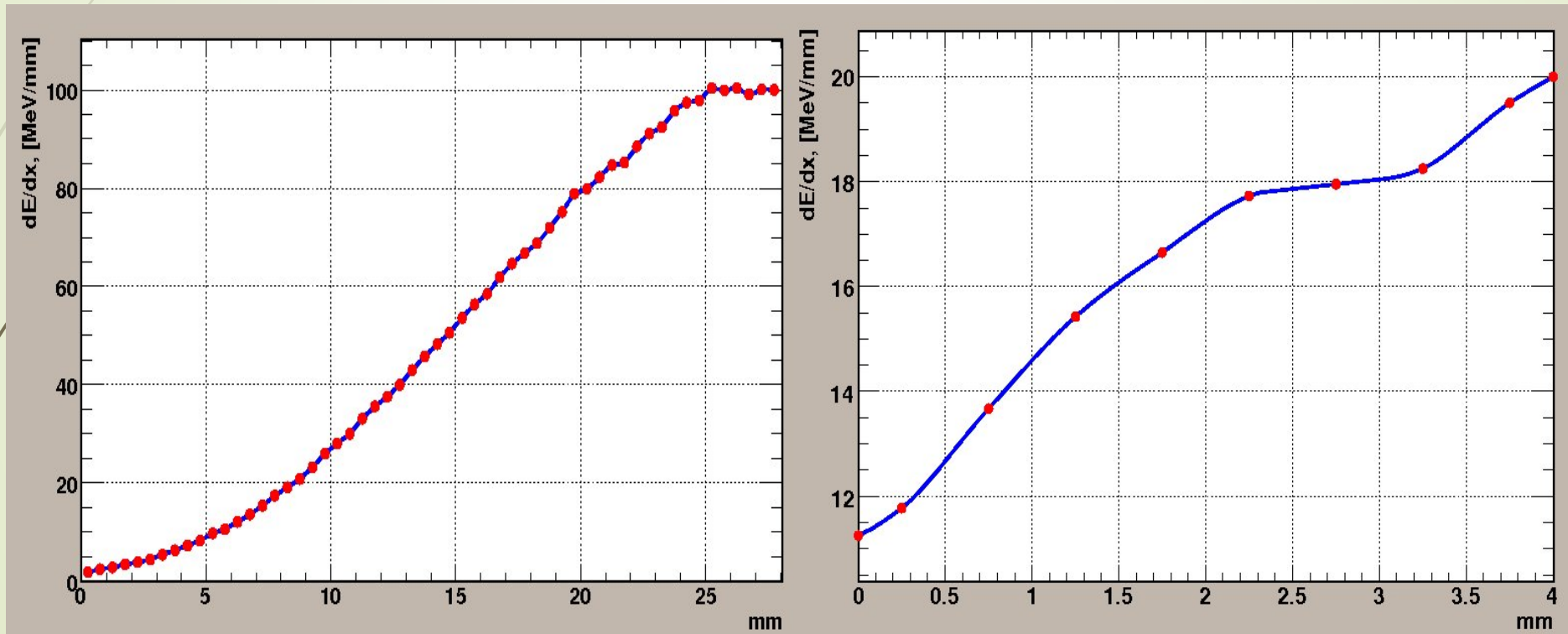| T lead alloy, C	ΔT, C	Flow rate lead, l/min	Flow rate water, l/min	P cooling, kW
300	8,5	7,2	4,8	2,86
350	10	7,2	4,8	3,36

Water temperature

Modeling the conversion process in the GEANT4 program

Dependence of the conversion coefficient on the thickness of the target
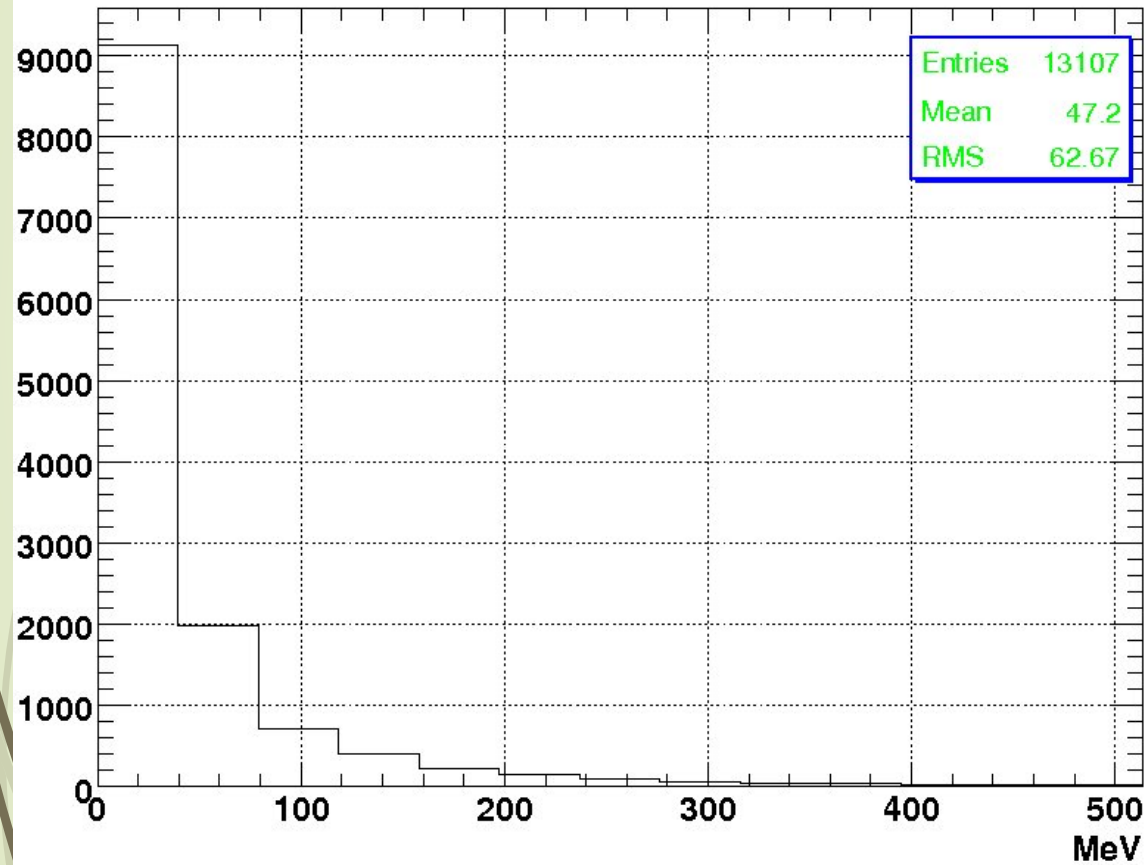E=6 GeV, ΔE/E=0.01, δ=1 mm, Δp/p=0.001

Modeling the conversion process in the GEANT4 program
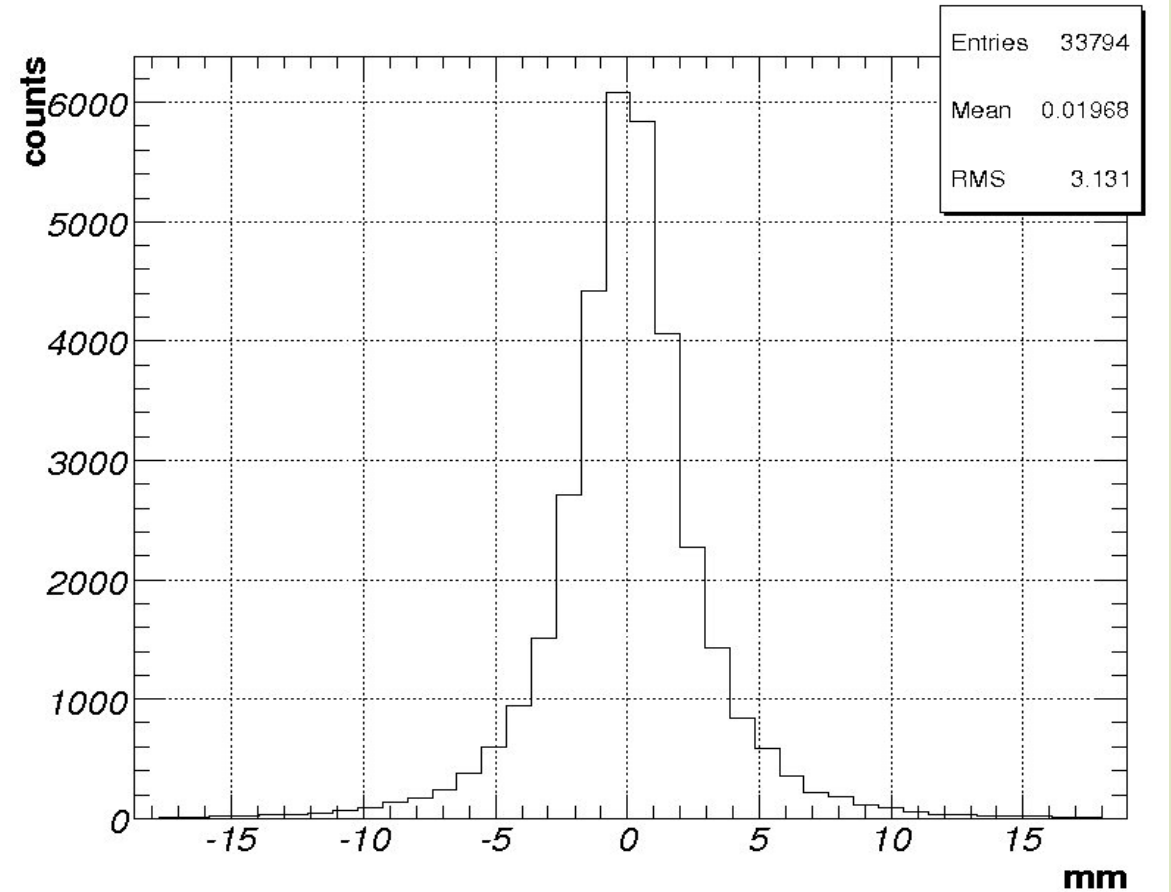

Ionization losses in lead. thickness of 28 mm

Ionization losses in ceramic window. thickness of 4 mm

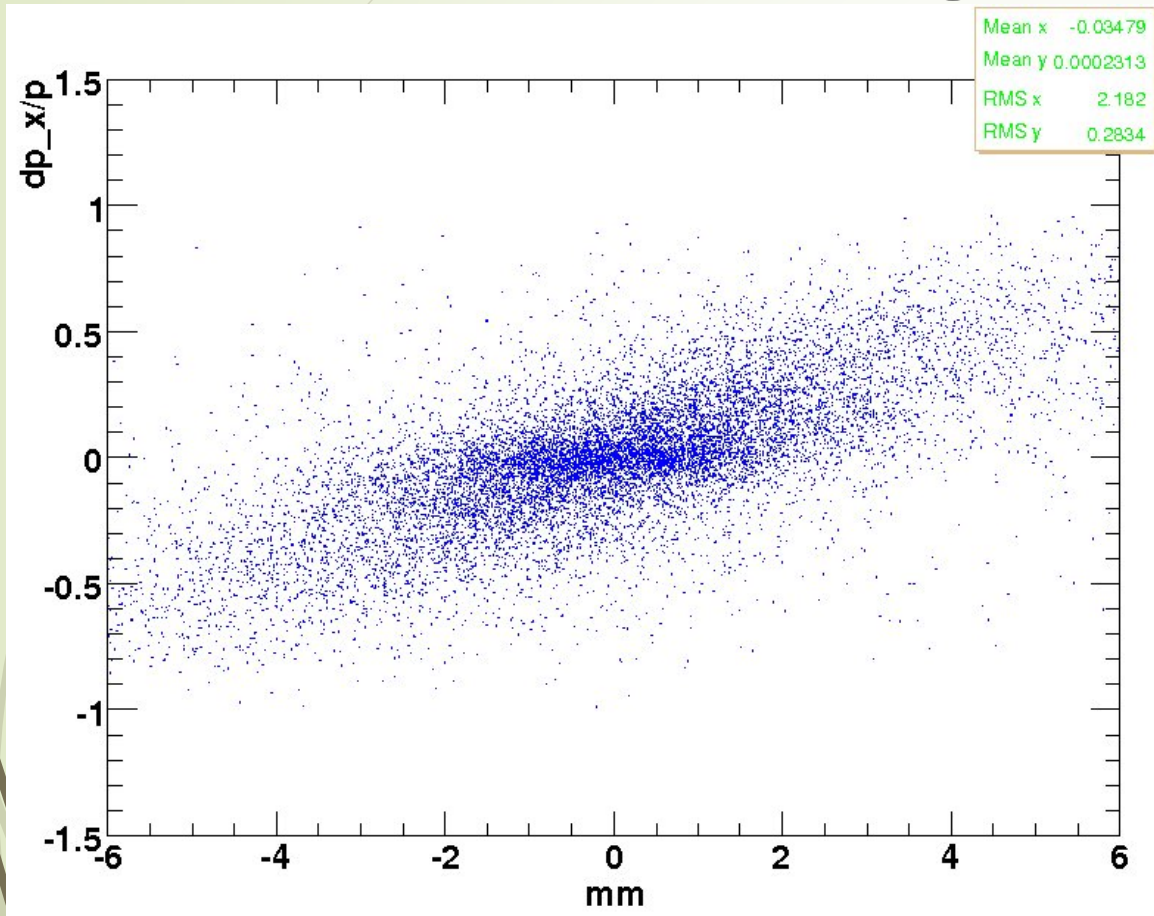# Modeling the conversion process in the GEANT4 program
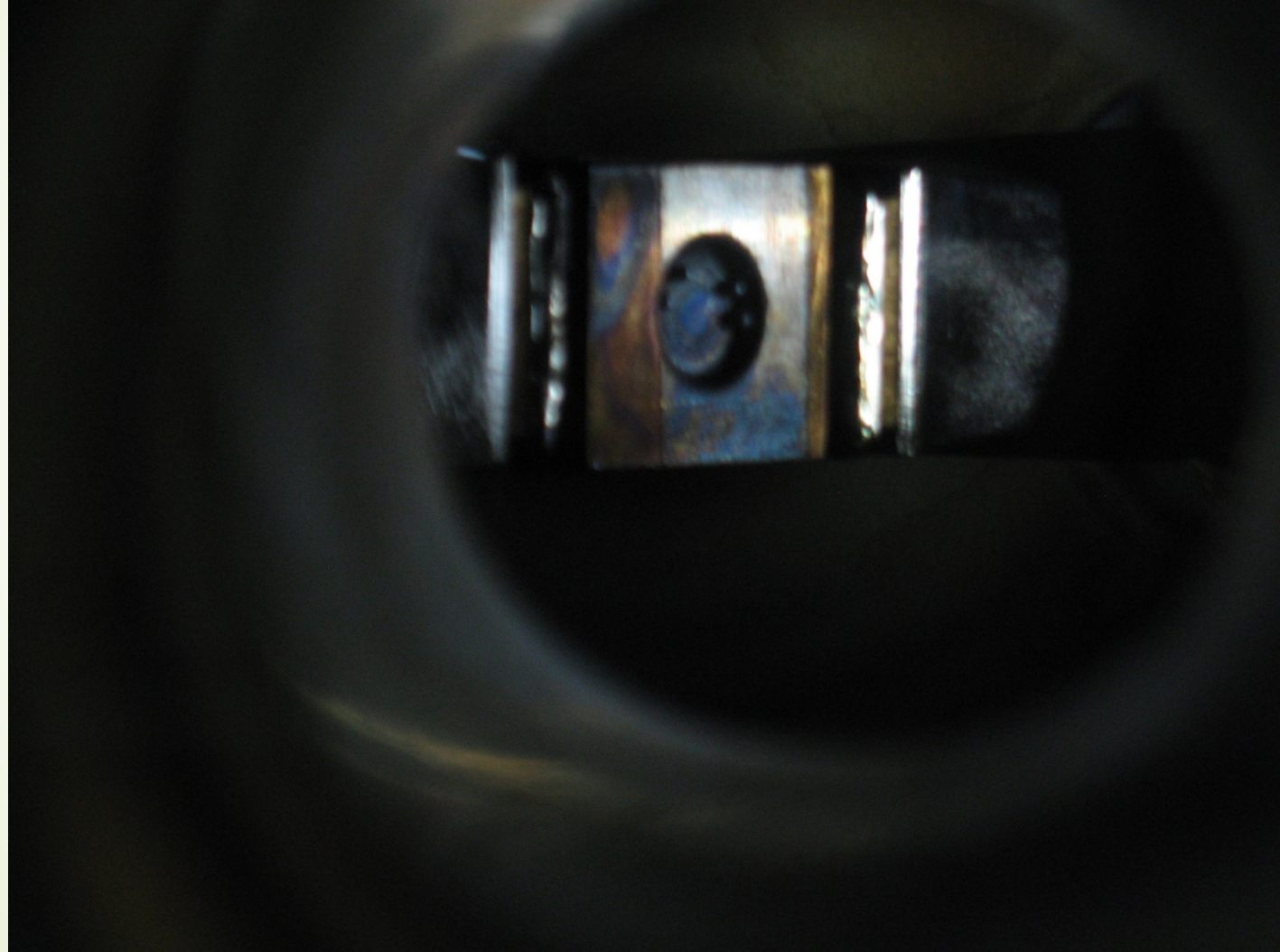

Energy distribution for positron beam

Spatial distribution for positron beam

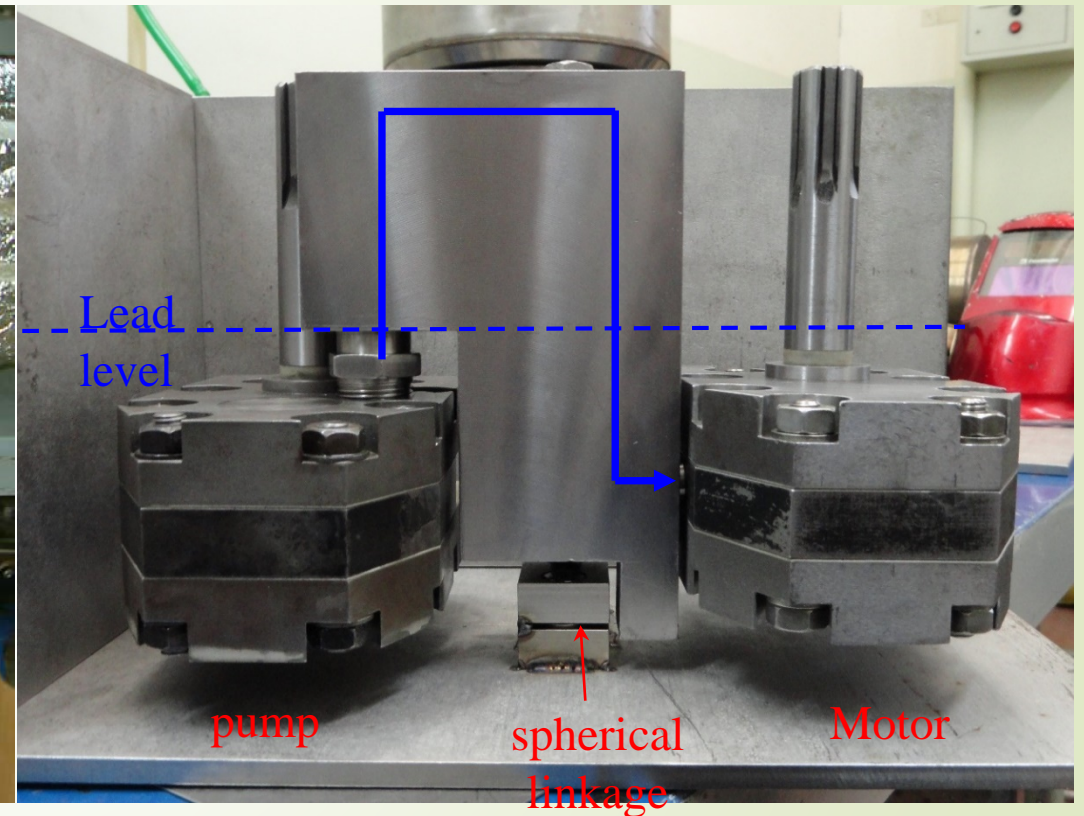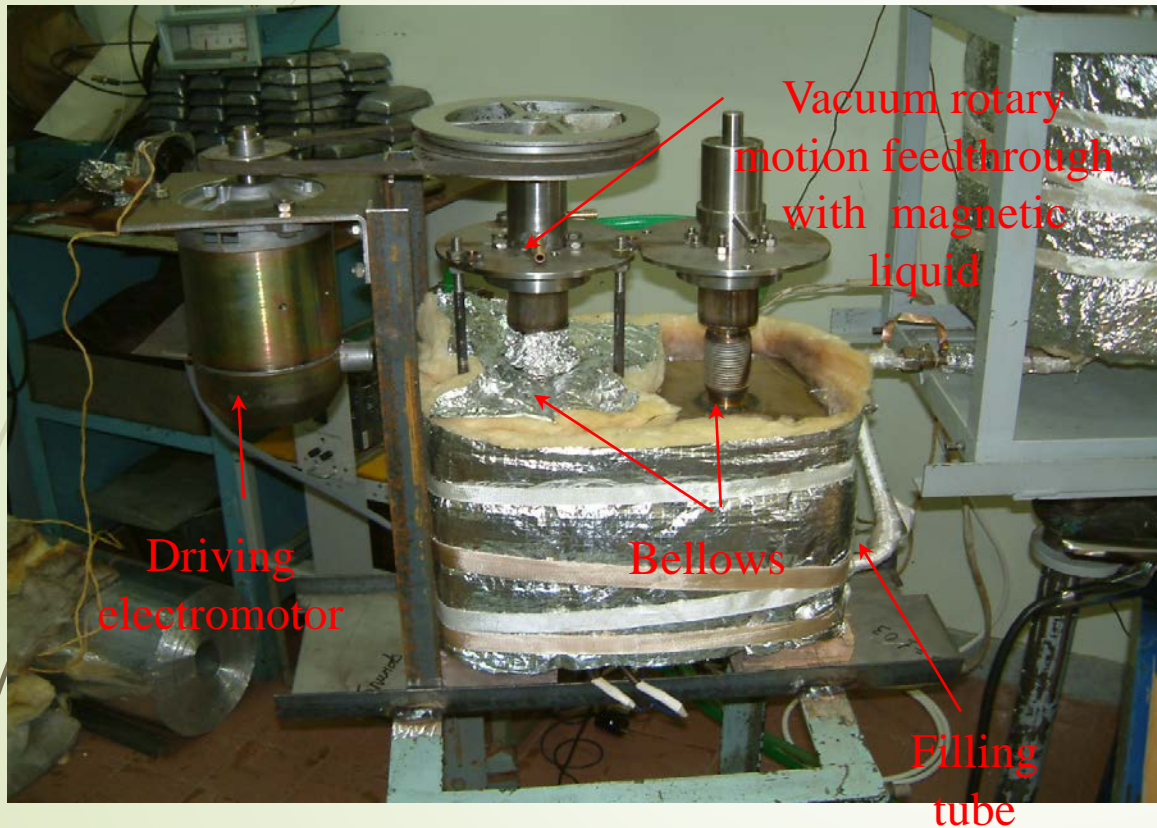# Modeling the conversion process in the GEANT4 program
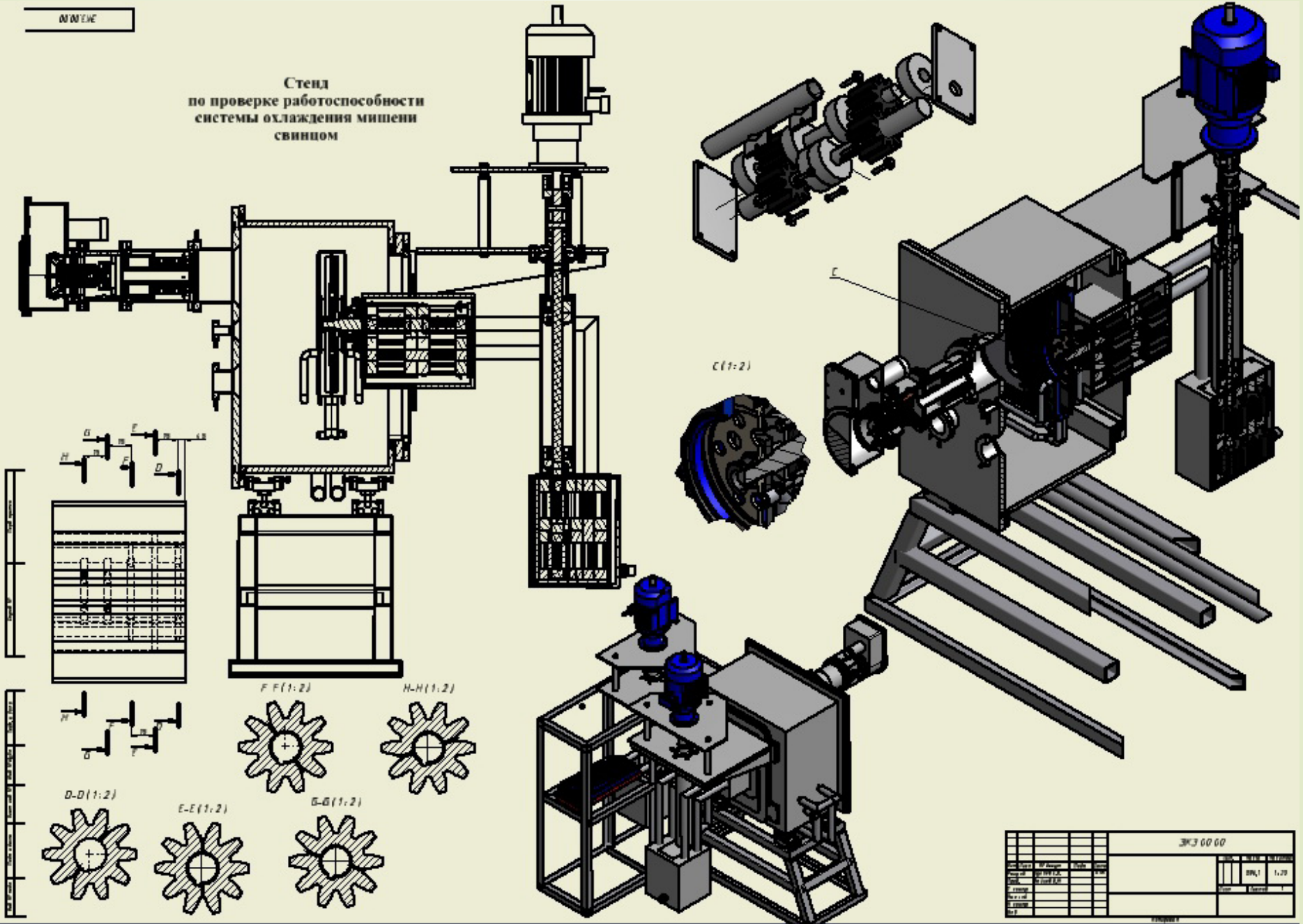

Images the beam on the phase surface.

Problems

Other applications the liquid-lead technologies

This system can be used as a hydraulic motor

Стенд
по проверке работоспособности
системы охлаждения мишени
свинцом

Thank you for attention!