



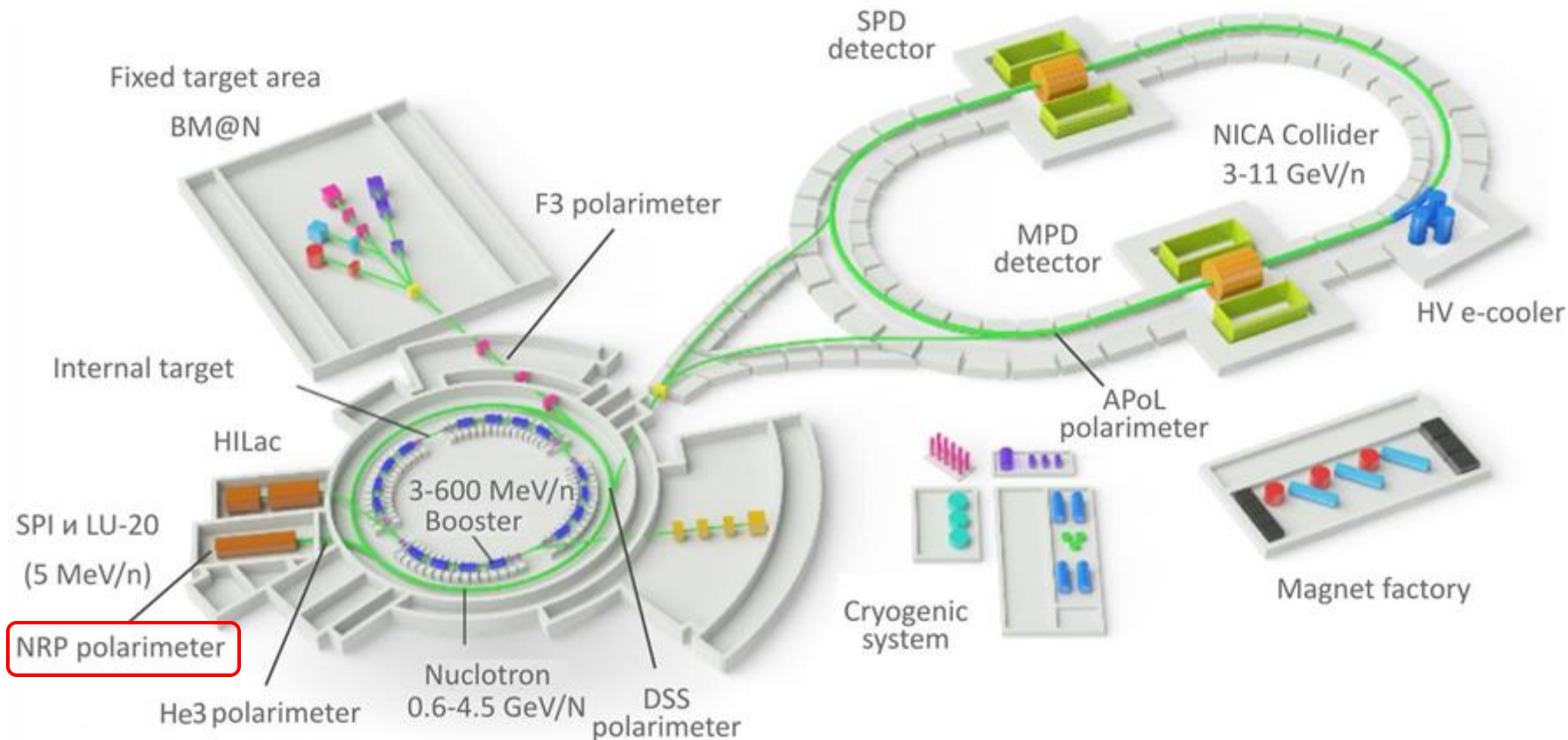
Status of the low energy proton and deuteron SPI polarimeter

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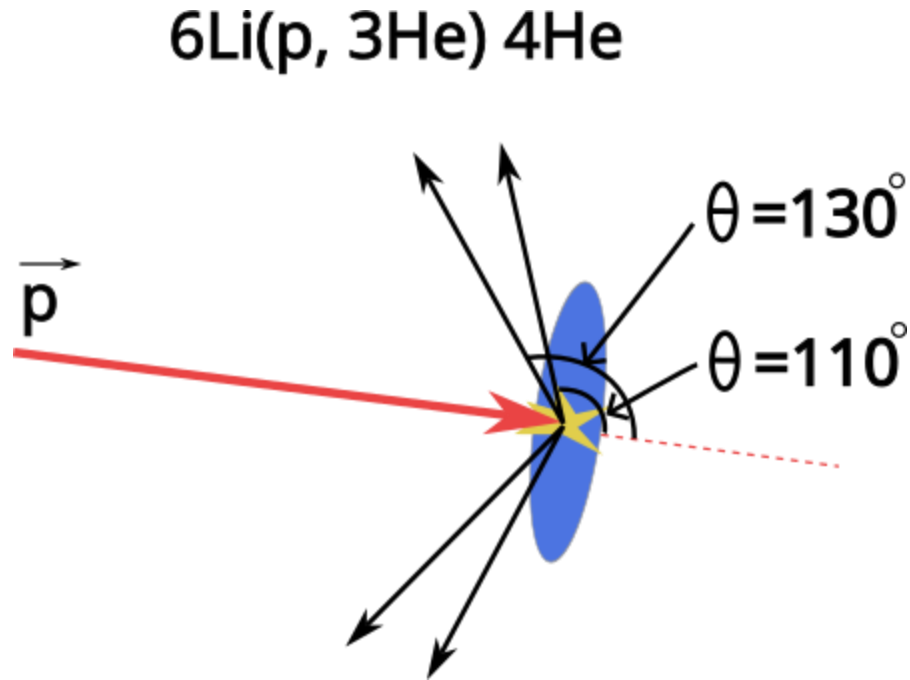
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Introduction

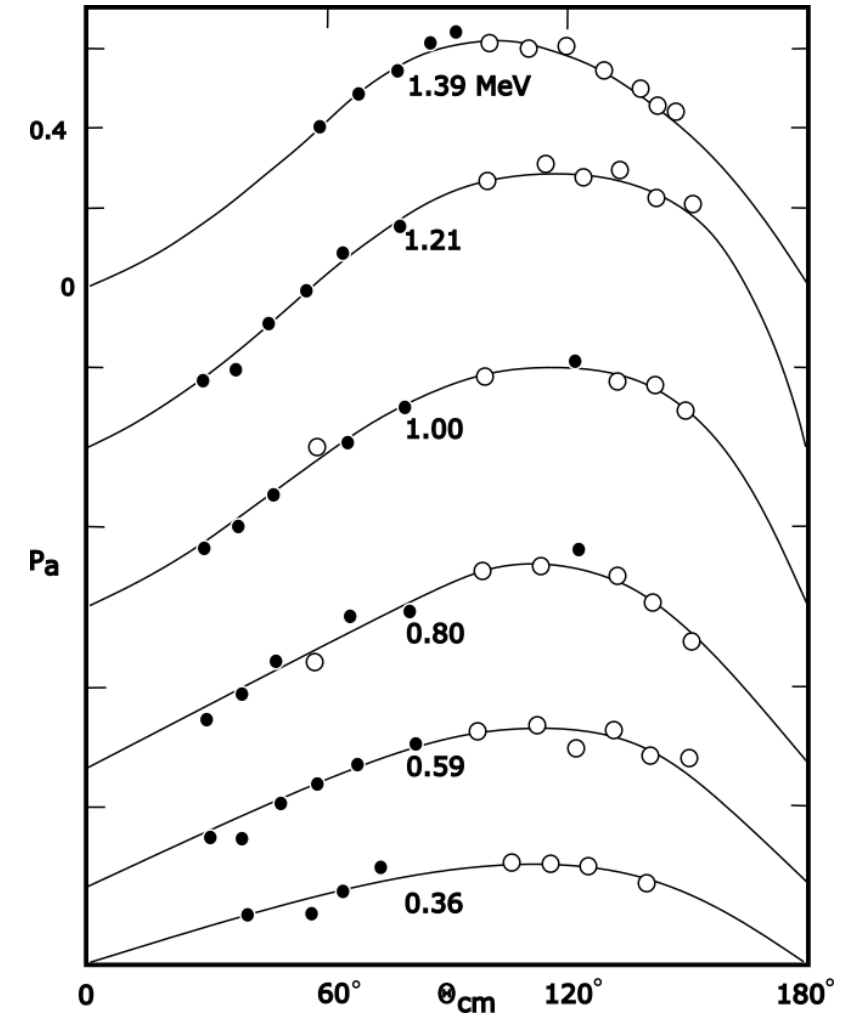


- Purpose: measurement of **vector** and **tensor** polarization of **deuteron** and **proton** beams in area of low energy
- Design: for measuring of polarization neutrons propose to use reaction $D(d, p)t$ and for protons reaction ${}^6\text{Li}(p, {}^3\text{He}){}^4\text{He}$
- Energies:
For reaction $D(d, p)t$ energy of beam **20-90 keV**, for ${}^6\text{Li}(p, {}^3\text{He}){}^4\text{He}$ energy **up to 150 keV**

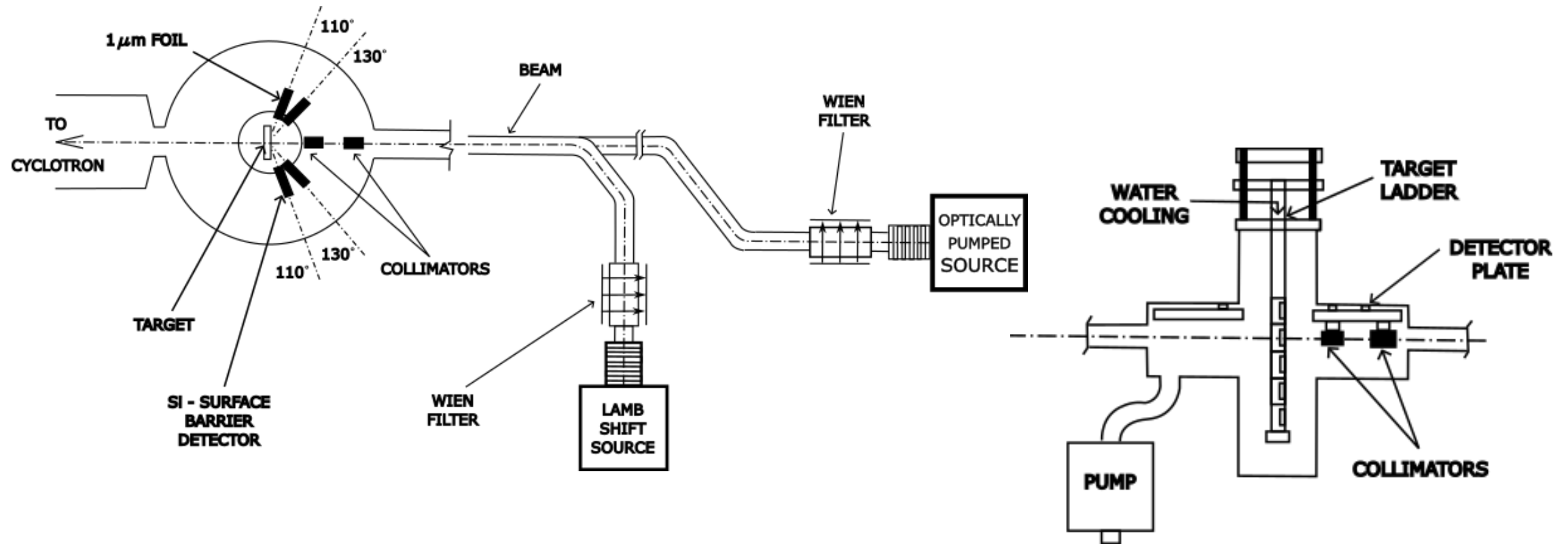
Polarimetry method for $6\text{Li}(p, 3\text{He}) 4\text{He}$ reaction (protons)



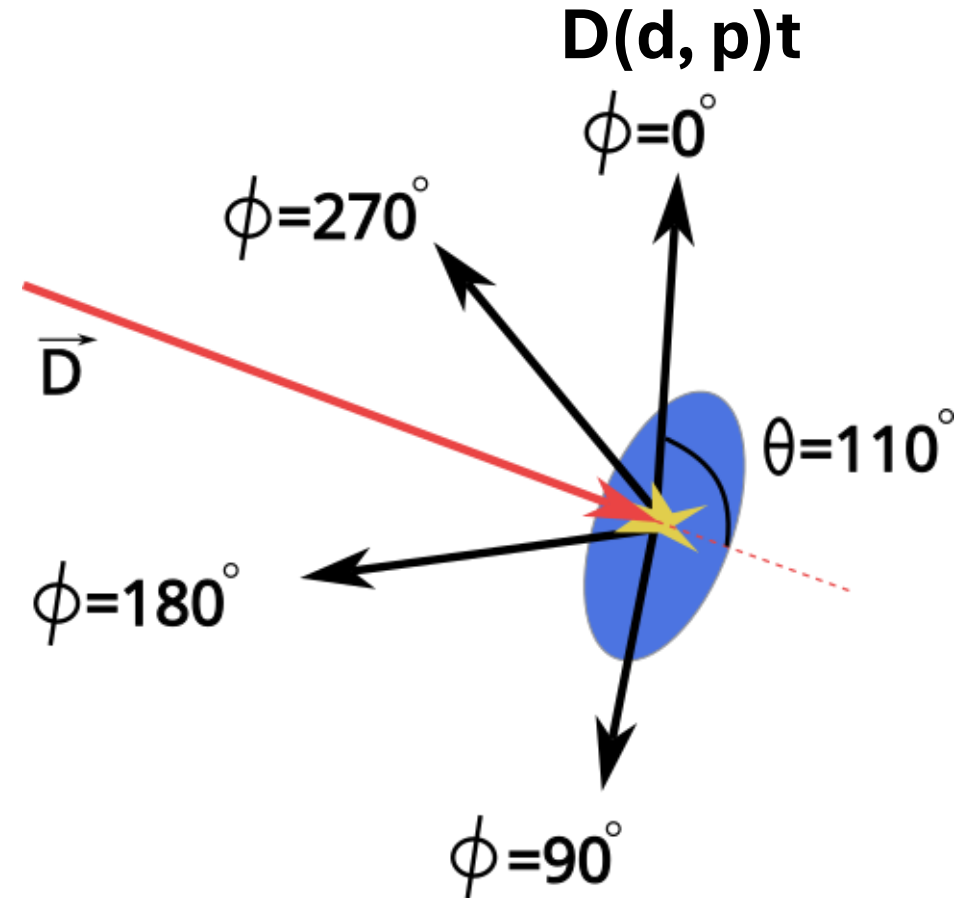
Energy	accuracy 2%	accuracy 10%
300 keV	~51 minuts	~2.0 minuts
150 keV	~19.8 hours	~48 minuts



Proton Polarimetry 150 – 300 keV



Polarimetry method for dd- reaction (deutrons)



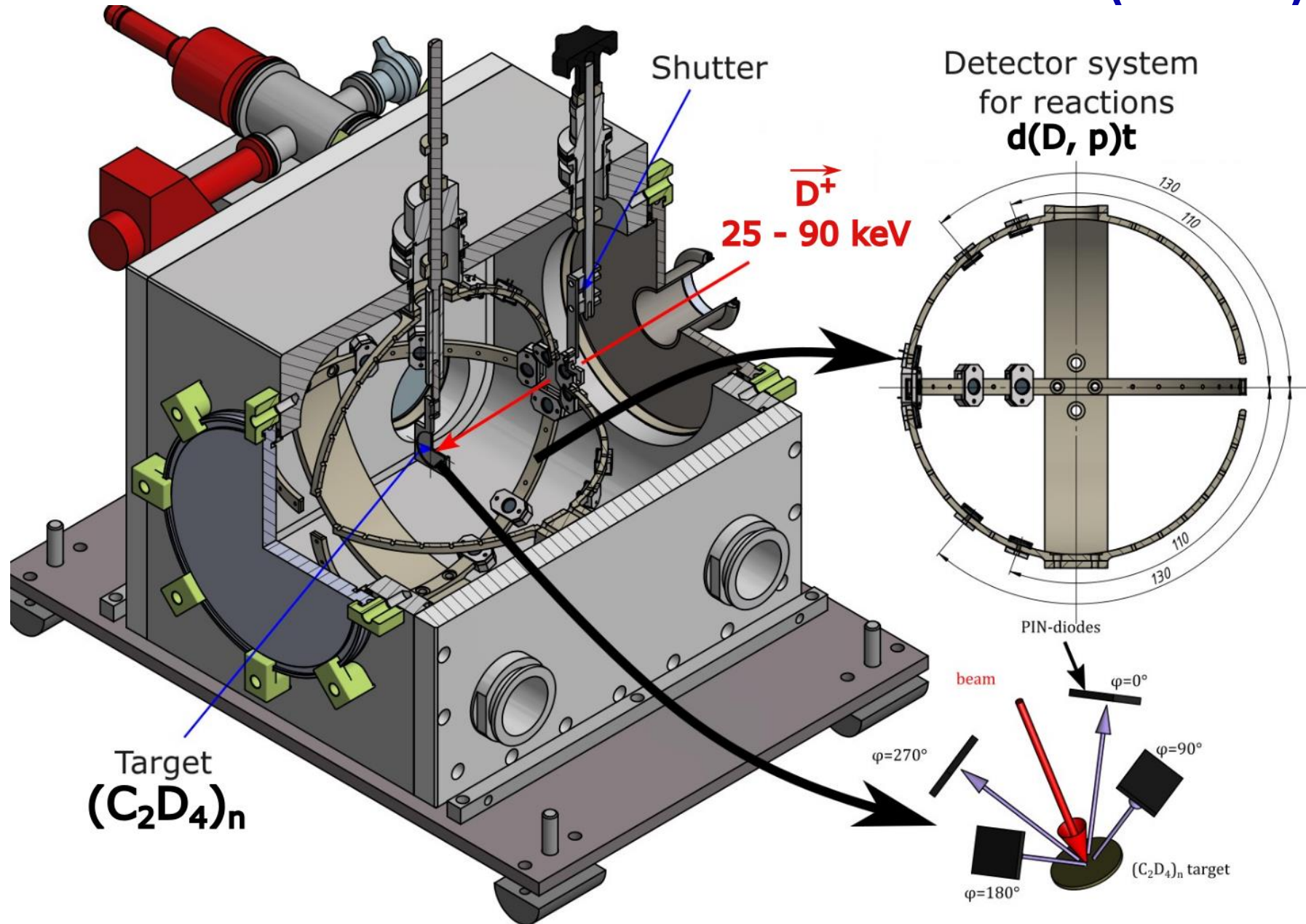
$$\sigma(\theta, \phi) = \sigma_0(\theta) \left[1 + \frac{3}{2} p_z i T_{11}(\theta) + \frac{1}{2} p_{zz} T_{20}(\theta) + \sqrt{\frac{3}{2}} p_{zz} T_{22}(\theta) \cos 2\phi + \dots \right]$$

$$p_z = \frac{2}{3} \cdot \frac{N_{+1} - N_{-1}}{N_{+1} + N_0 + N_{-1}} \cdot \frac{1}{iT_{11}(\theta)}$$

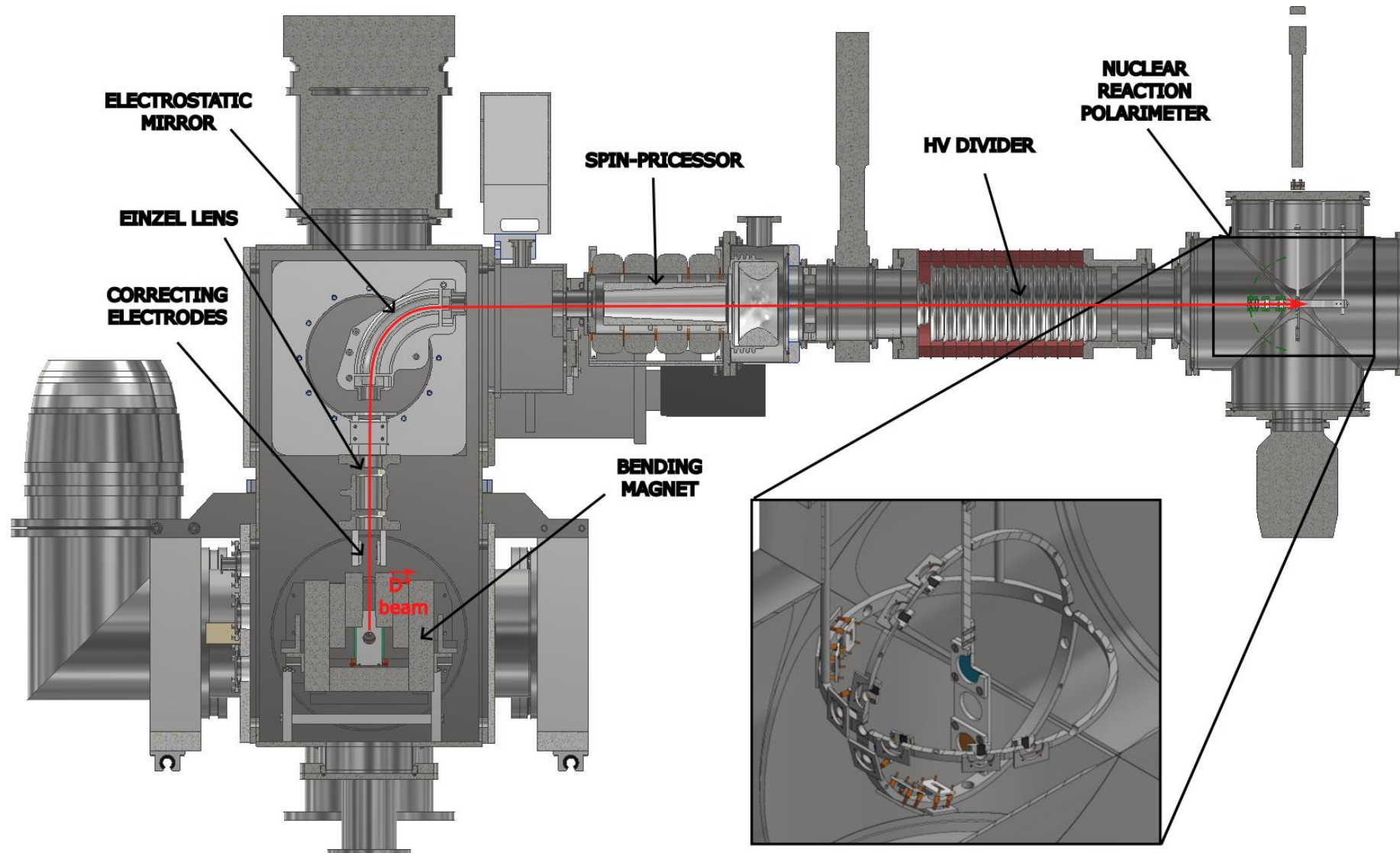
$$p_{zz} = 2 \cdot \frac{N_0 - \frac{1}{2}(N_{+1} + N_{-1})}{N_{+1} + N_0 + N_{-1}} \cdot \frac{1}{T_{20}(\theta)}$$

Energy	iT_{11}	T_{20}
30 keV	-0.1082	0.2845
50 keV	-0.1099	0.2468
70 keV	-0.1139	0.2212
90 keV	-0.1045	0.1998

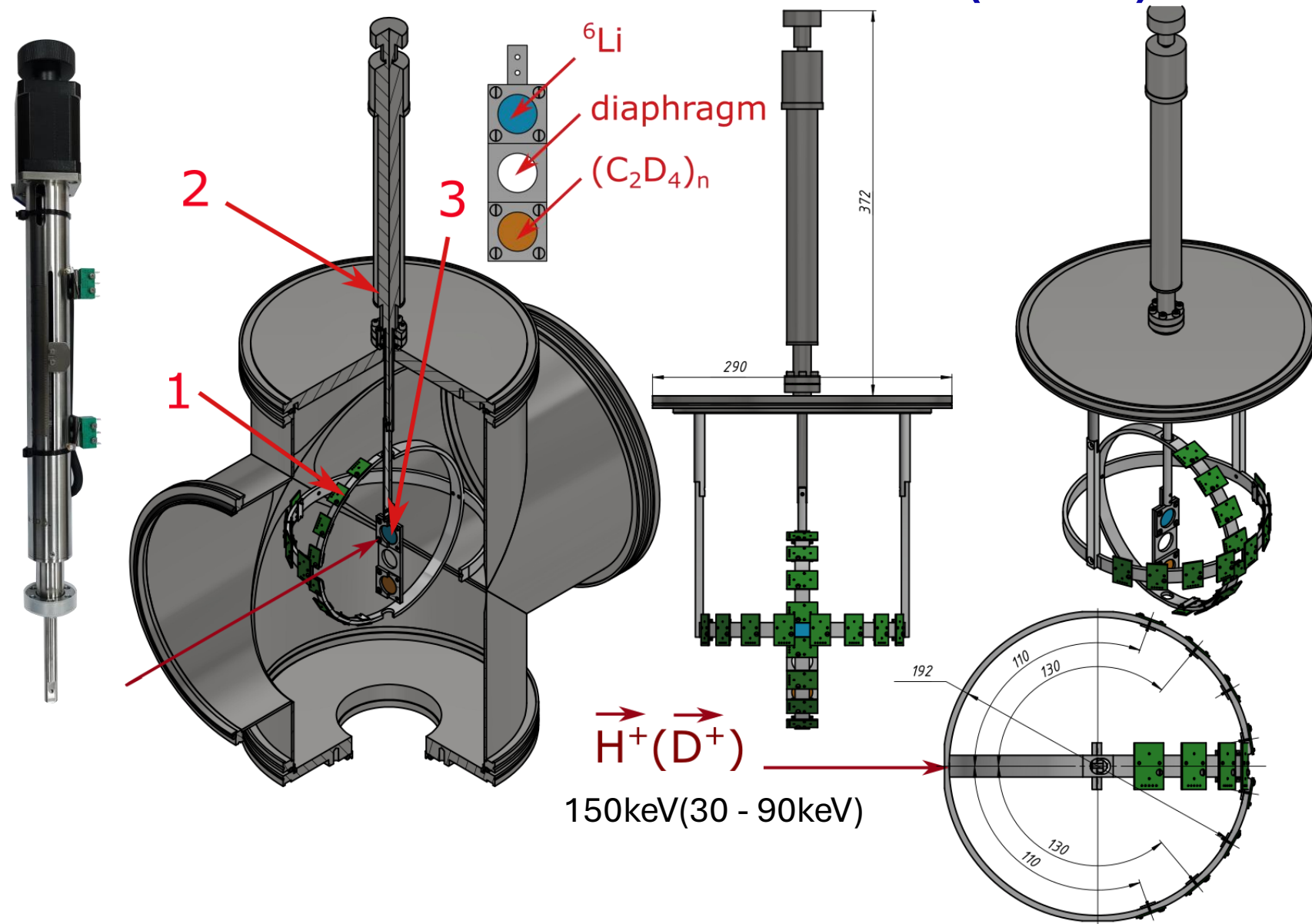
Deuteron Polarimeter 25-50 keV (NRP)



Experimental setup

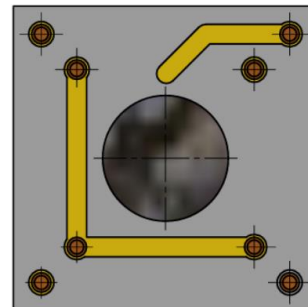
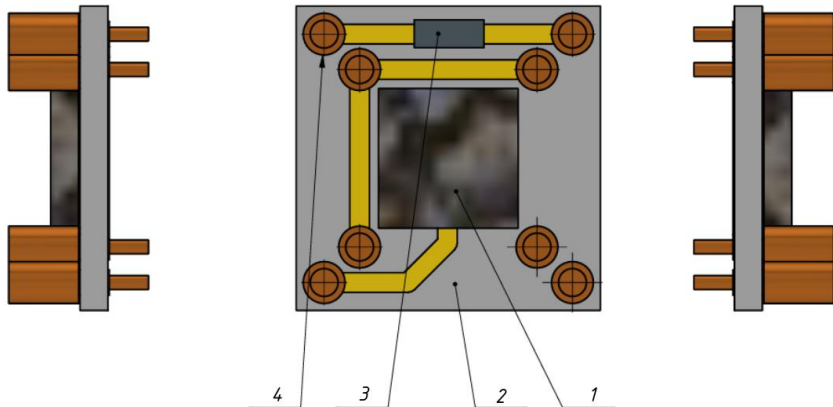
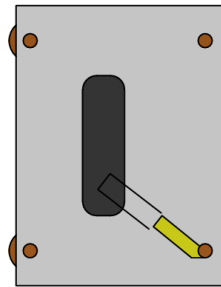
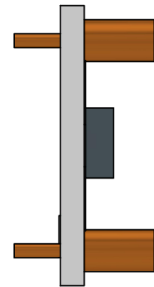
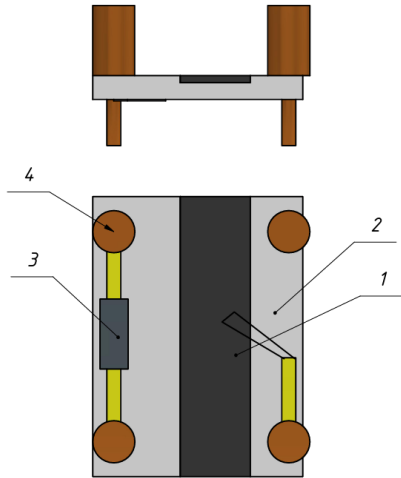


Nuclear Reaction Polarimeter (NRP)



Detectors layout

1. Detector holder
2. Detector
3. Capacity
4. Contacts



- **Detector Configuration:** An array of **16** silicon detector units.
- **Active Area per Unit:** **5 mm x 20 mm**. (**10 mm x 10 mm** in production)
- **Sensor Specifications:**
 - Thickness: **300 μm**
- **Performance Parameters:**
 - Maximum Count Rate: **2 MHz**
 - Energy Resolution: **< 30 keV**
 - Time Resolution: **500 ns**

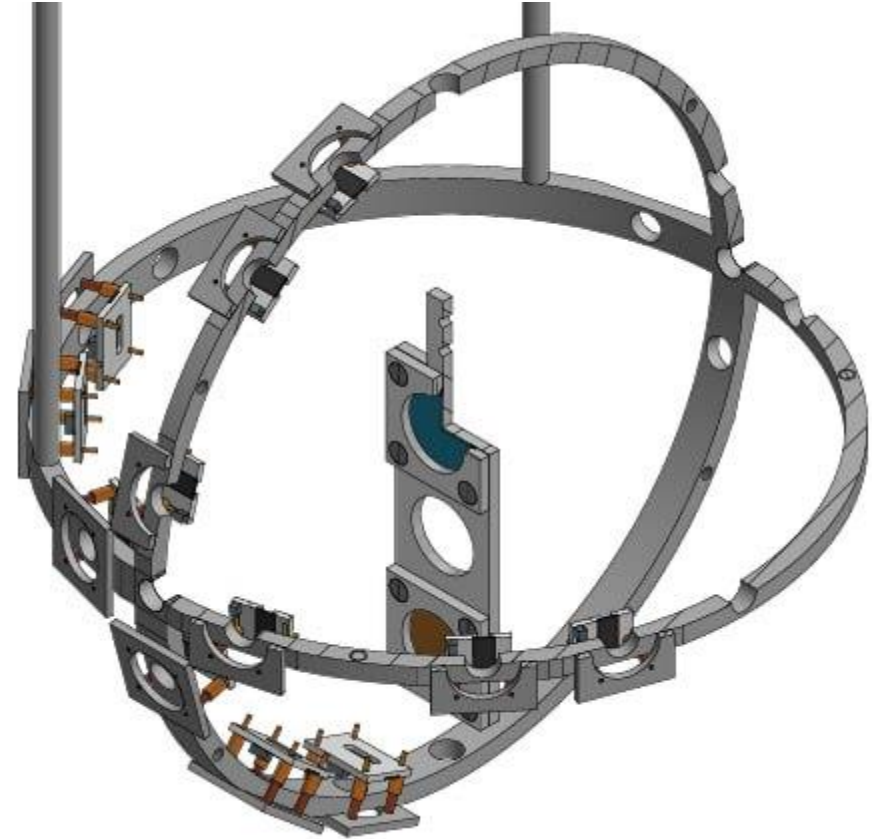
Conclusions

Status:

- Vacuum chamber is ready
- Detectors 5 x 20 is ready for mounting
- Setup of electronics is ready
- Linear driver is already delivered
- Inner parts of polarimeter designed and ready for production

Near-Term plans:

- Find decision of 6Li target production
- Producing main flange with signal fitthrough
- Test of polarimeter at measuring position
- Design setup of einz lens, which can replace NRP





Thank you for your attention!!!