

Reinstallation of modified 'SK ring' on GOLEM tokamak

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Motivation:

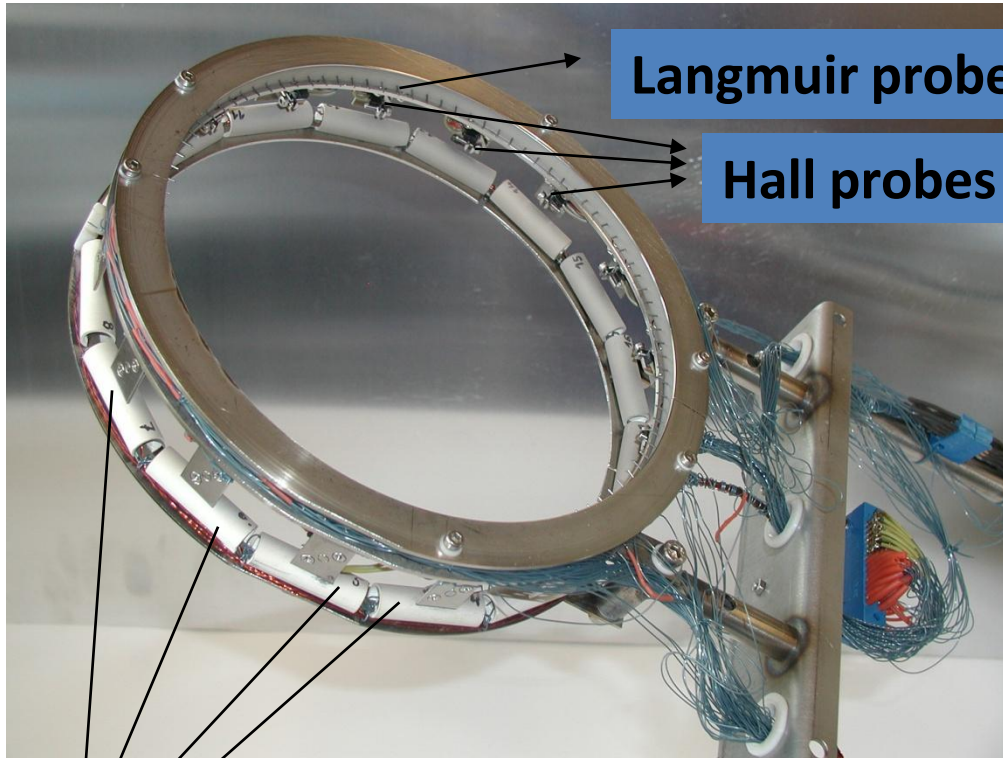
- Test of new high temperature Hall sensors from PUT, Poznan, Poland (link to EFDA WP2010, possibly WP2011; certain ITER and reactor relevance)
- Evaluation of plasma position on GOLEM.
- Turbulence studies.
- Previous experience and hardware exists.

Full poloidal ring of:

16 (8) Hall sensors for plasma position

16 coils for MHD studies

96 Langmuir probes for electrostatic turb.



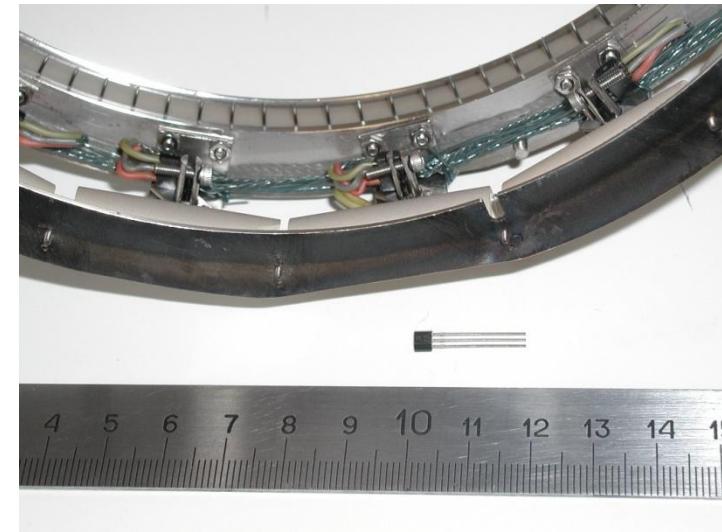
Langmuir probes

Hall probes

Pick-up coils

Two issues:

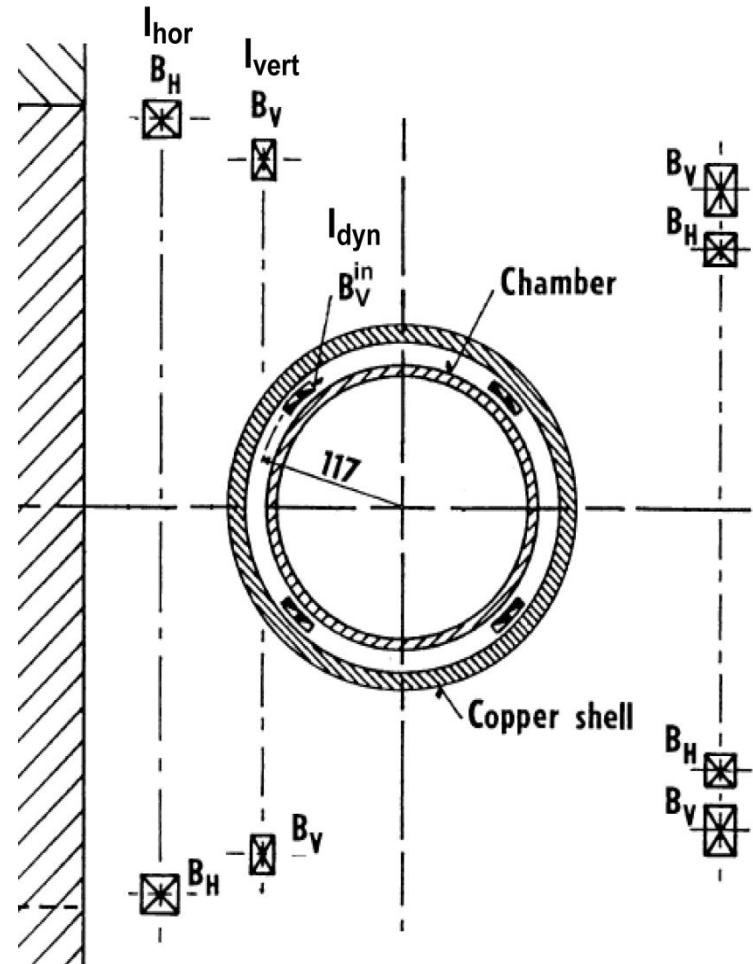
mystery of 2x higher magnetic field and, not satisfactory rigidity of ring support structure leading to vibrations affecting mainly coils signals.

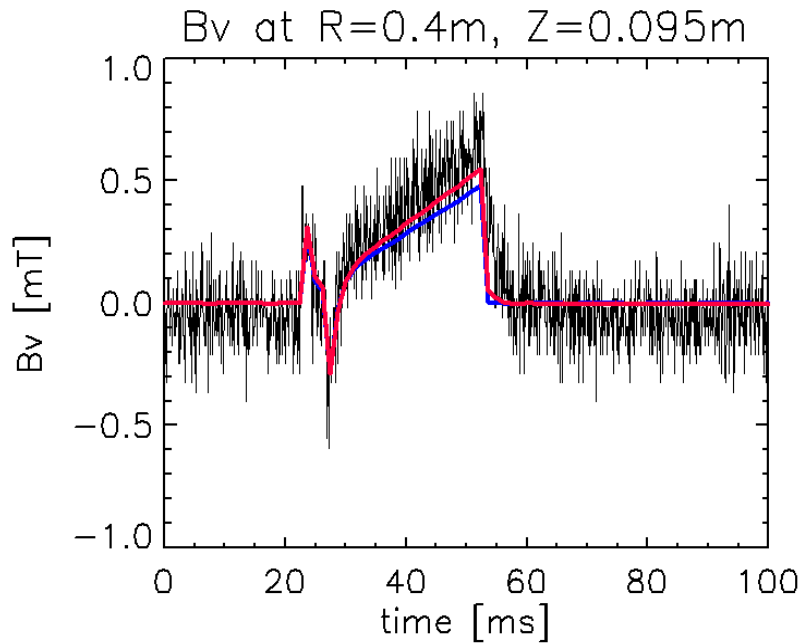


CASTOR external windings with significant currents:

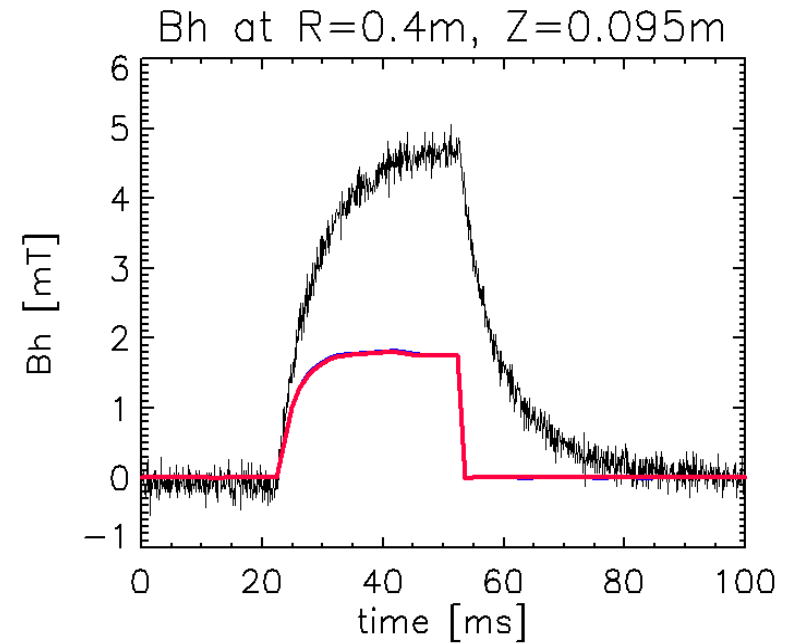
1. **Toroidal field coils:** dB_t/dt routinely measured – well compensated.
2. **Primary winding:** dI_{prim}/dt routinely measured, optionally, I_{prim} can be measured on $0.2m\Omega$ resistor which is included in the circuit.
3. **Feedback windings:** routinely measured: I_{dyn} , I_{vert} , I_{hor} .
4. **Tokamak chamber:**
 $I_{liner} = U_{loop} / R_{liner}$, $R_{liner} = 5.7m\Omega$, U_{loop} routinely measured, eddy currents

Feedback windings





Good agreement

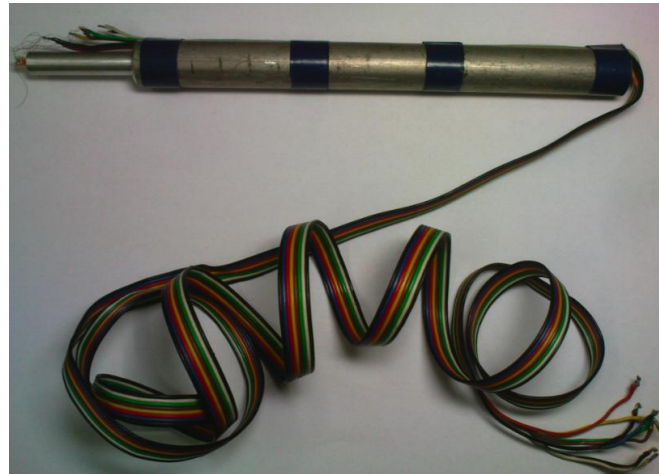
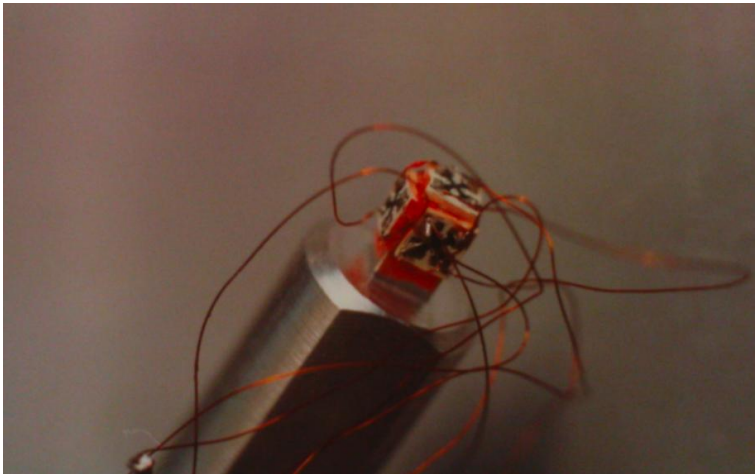


Twice as large magnetic field is measured than expected - not understood yet

Present status and plans

Hall sensors:

- Negotiations with Prof. Oszwaldowski (PUT, Poznan, Poland) started.
 - size – cube with $a=4-5$ mm (smaller possible at higher price)
 - frequency response – req. at least 5-10 kHz
 - price – about 500 Euro(per probe or sensor?) (Visegrad fund?)



Support structure:

- Initial contact with VACUUM Praha.
 - modifications of present SS difficult (coils can not be dismantled).
 - linked to the final size and shape of HS.
 - keep coils and Langmuir probes?

<u>PARAMETER/VALUE</u>	<u>ETHS</u>	<u>HGT-3010</u>	<u>HGT-3030</u>
Working temperature range, ΔT	-270 °C to +300 °C,		-40 °C to +100 °C
Working magnetic field range, ΔB		0–5 T	
Input/output resistance, R	10 Ω	1 Ω	2 Ω
Nominal driving current, I_n		50 mA	100 mA
Maximum driving current, I_{max}		100 mA	300 mA
Magnetic field sensitivity, S	100 mV/T	(5–10) mV/T	(60–100) mV/T
Temperature coefficient of resistance, $ \alpha $	< 0.10 %/°C	0.18 %/°C	0.15 %/°C
Temperature coefficient of magnetic sensitivity, β	< 0.04 %/°C	< 0.005 %/°C	< 0.04 %/°C
<u>price (1D or 3D)</u>	cca 500 Euro	\$334 (\$774*)	\$427

*) in cryogenic version (with working temperature range -258 °C to +100 °C)