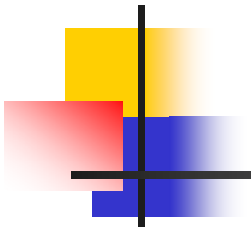


Progress
‘Towards magnetic field measurement benches’

Responsibility of Dubna team

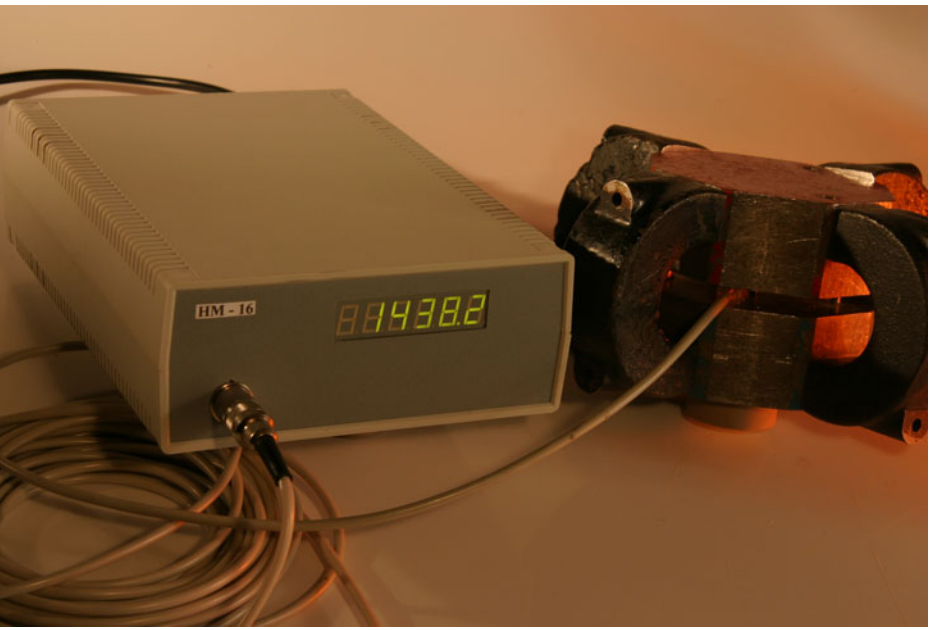
- Simulation of the magnets
- Magnetic measurements on the prototype and the design of the instrumentation for it
- Slow control of spectrometer
- Alignment and stabilization
- Production of magnets (in case of acceptance of the project)

NMR and Hall magnetometers

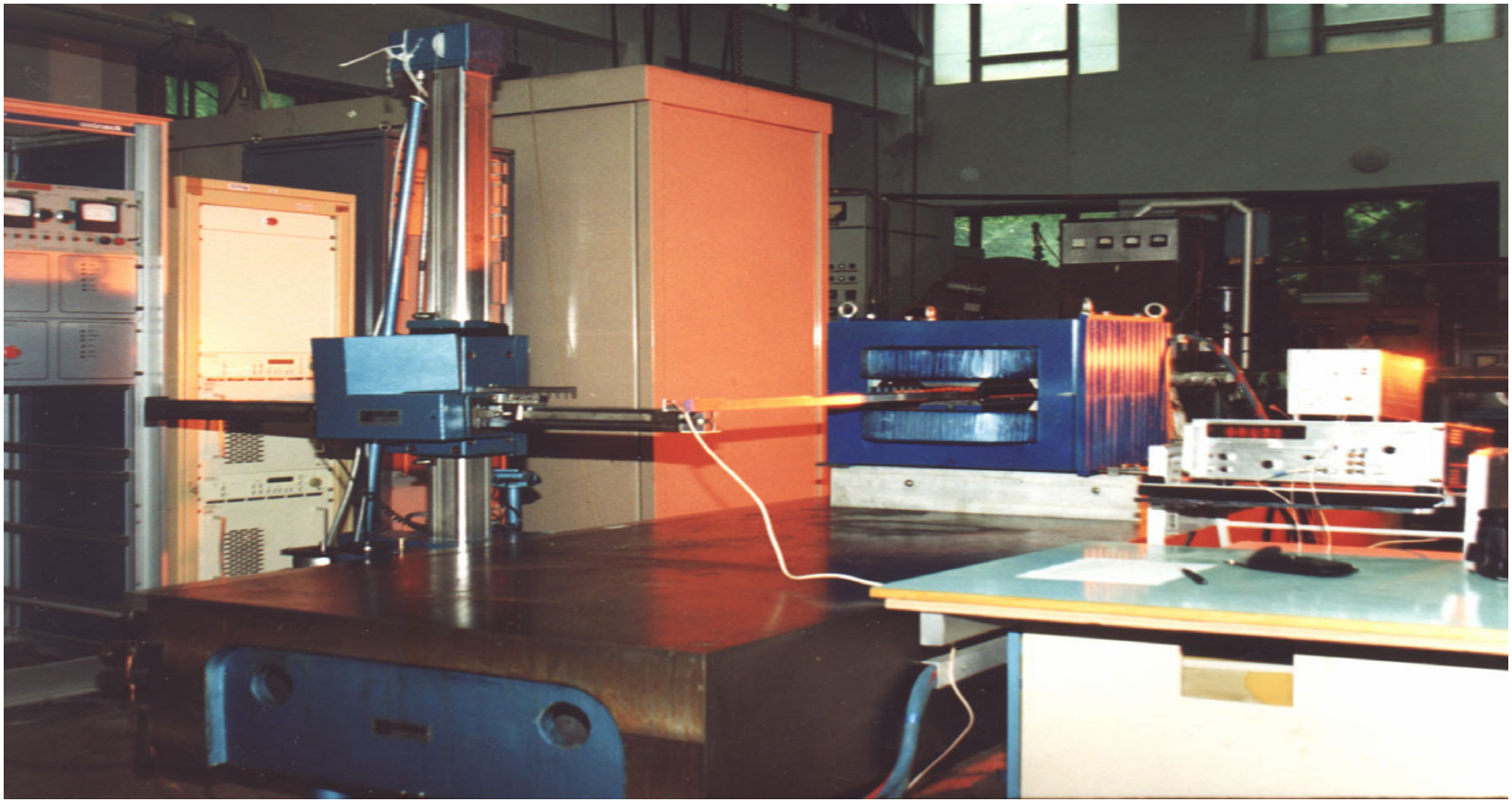
- Equipment was tested
- Hall magnetometer was calibrated and programmed
- Both magnetometers are ready for work and will be moved to the electronic hardware team (Oleg Brovko) for integration into the control system

Magnetic field measurement system activity

Dubna magnetometers (Hall and NMR)



Modification of the magnetic field measurement bench



Modification of the magnetic field measurement bench

- Elongation of the longitudinal measurement base (3.5 -> 5 m)
- Installation of the high accuracy (~ some μm) linear encoder (HEIDENHAIN LIDA-485)
- Change of the old DC motors by modern stepping ones
- Change of the old control hardware (70-th) by the modern ones

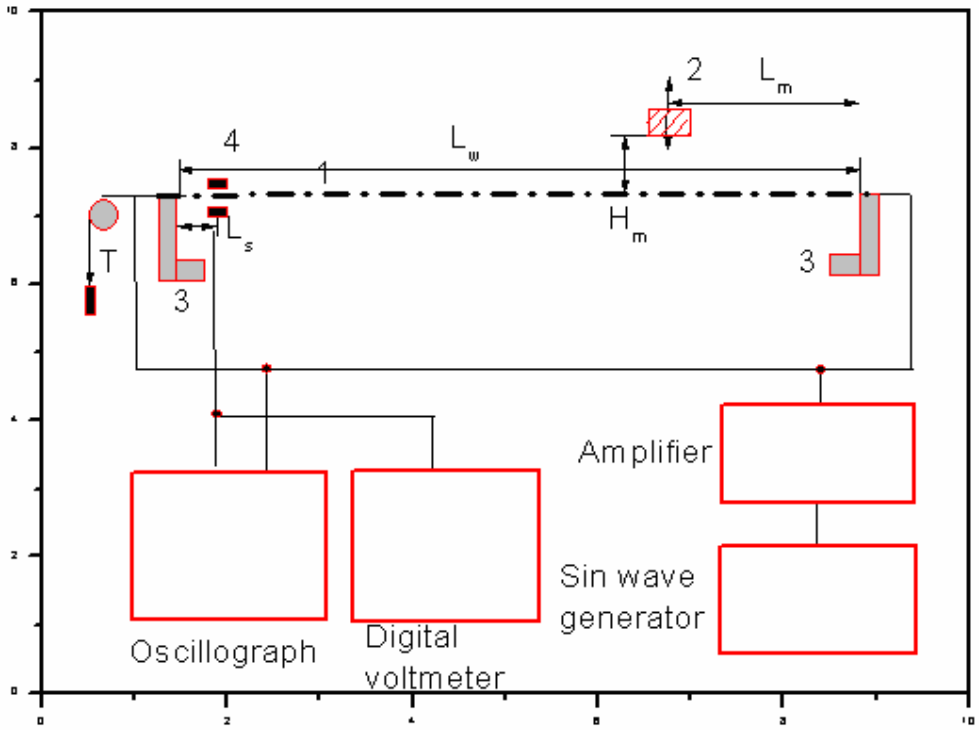
Modification of the magnetic field measurement bench

- The design of the new mechanical elements is in progress (finishing at the end of 2005)
- The linear encoder was bought
- The new hardware design is in progress (finishing at the beginning of 2006)

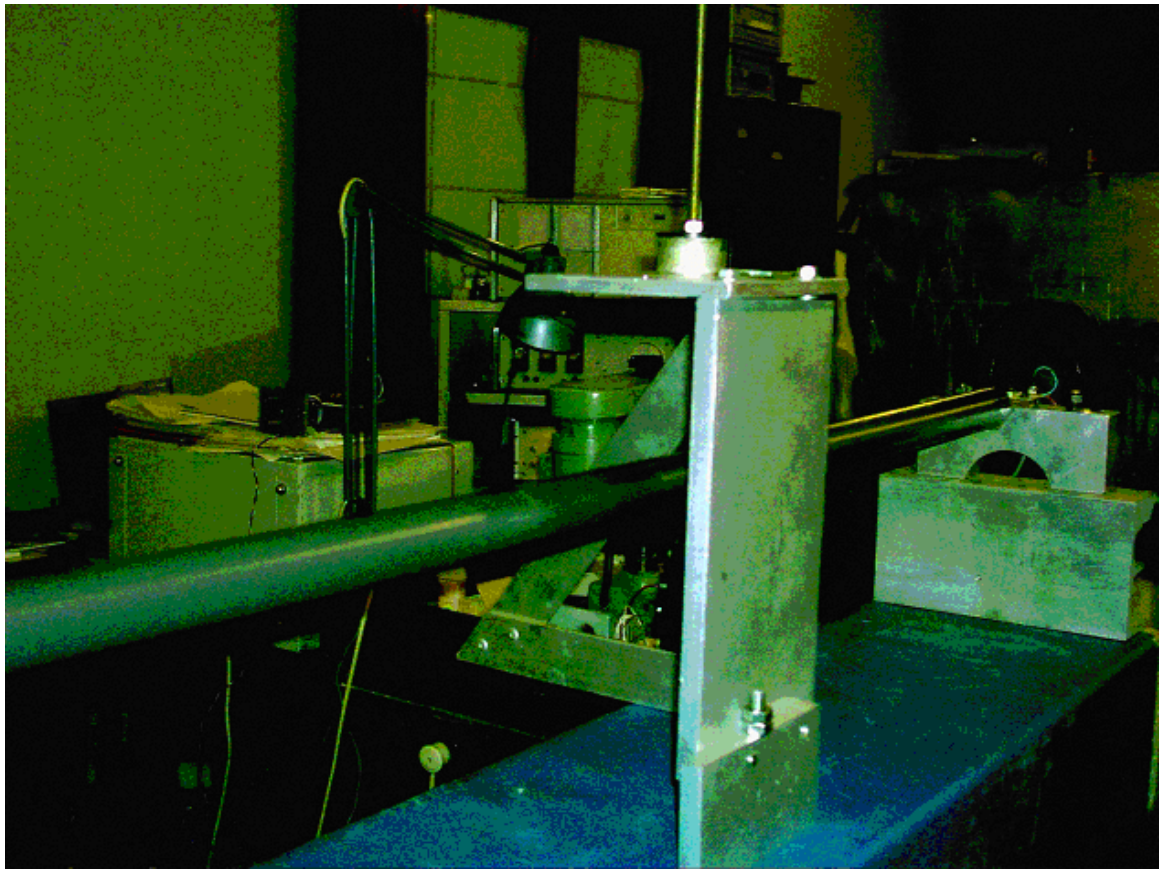
BPMs calibration requires - the main magnet field integral has to be zero with accuracy 10^{-5} from the working one

- The possible way for measurement zero field integral (1 – 10 G*cm required) – vibrating wire technique (VWT)
- Test measurement bench for VWT was designed and commissioned in 2004 – beg.2005 (accuracy 0.1 G*cm was demonstrated)

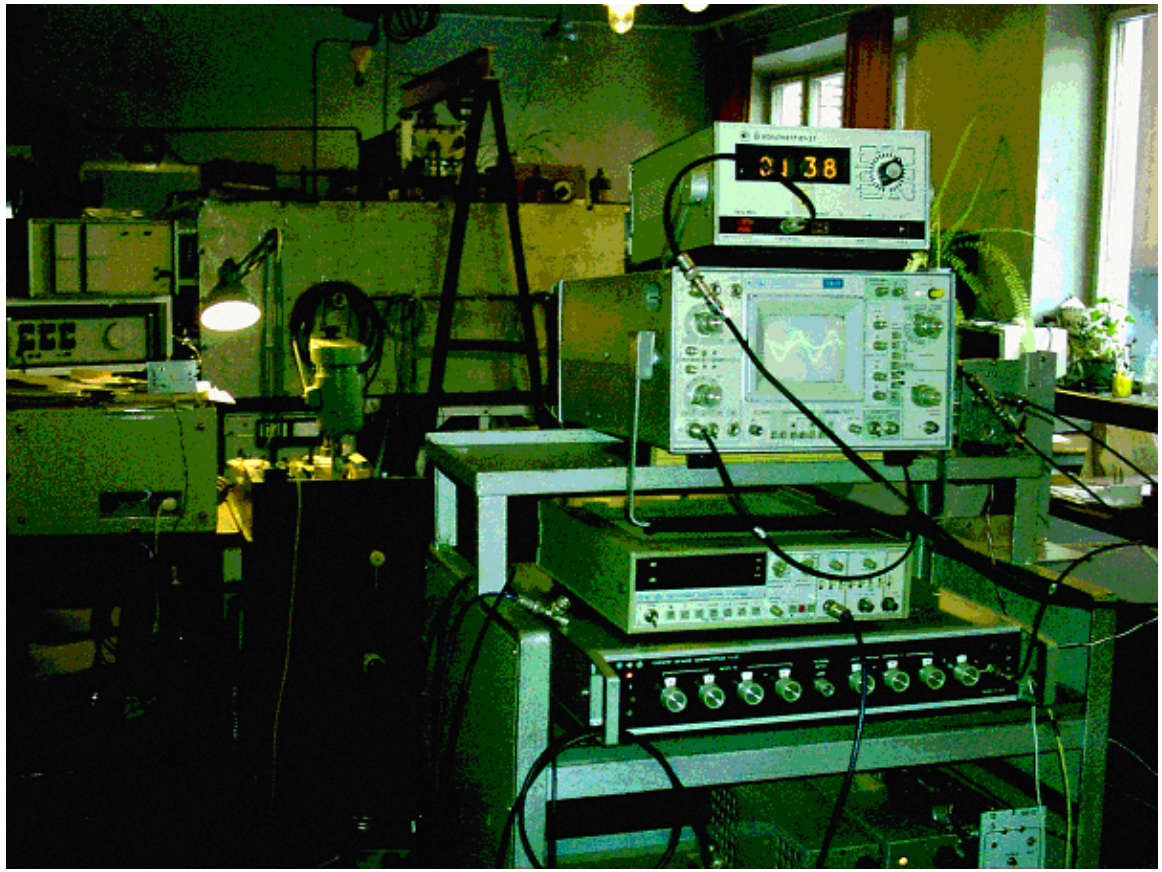
Vibrating wire technique



Vibrating wire technique



Vibrating wire technique



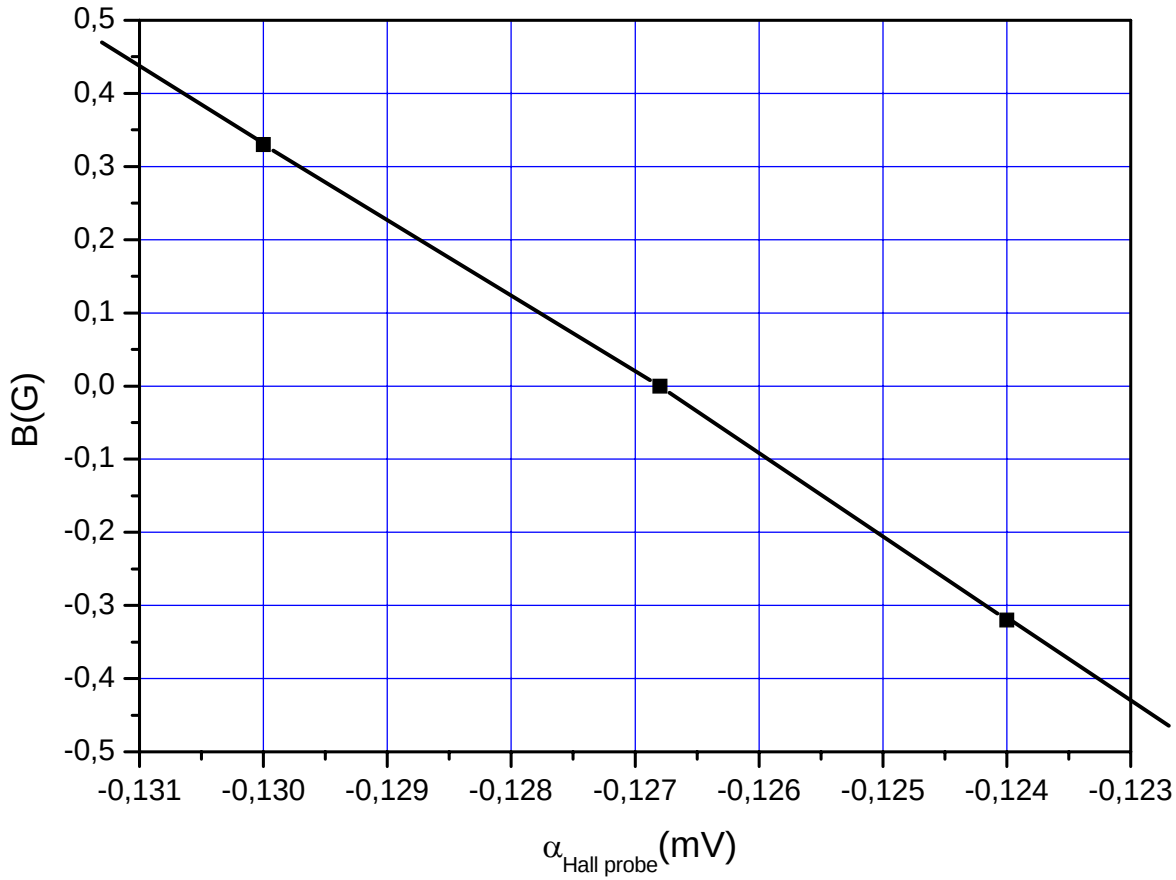
Vibrating wire technique working bench

- The design of the mechanical elements is in progress (finishing at the end of 2005)
- The control hardware design is in progress (finishing at the beginning of 2006)

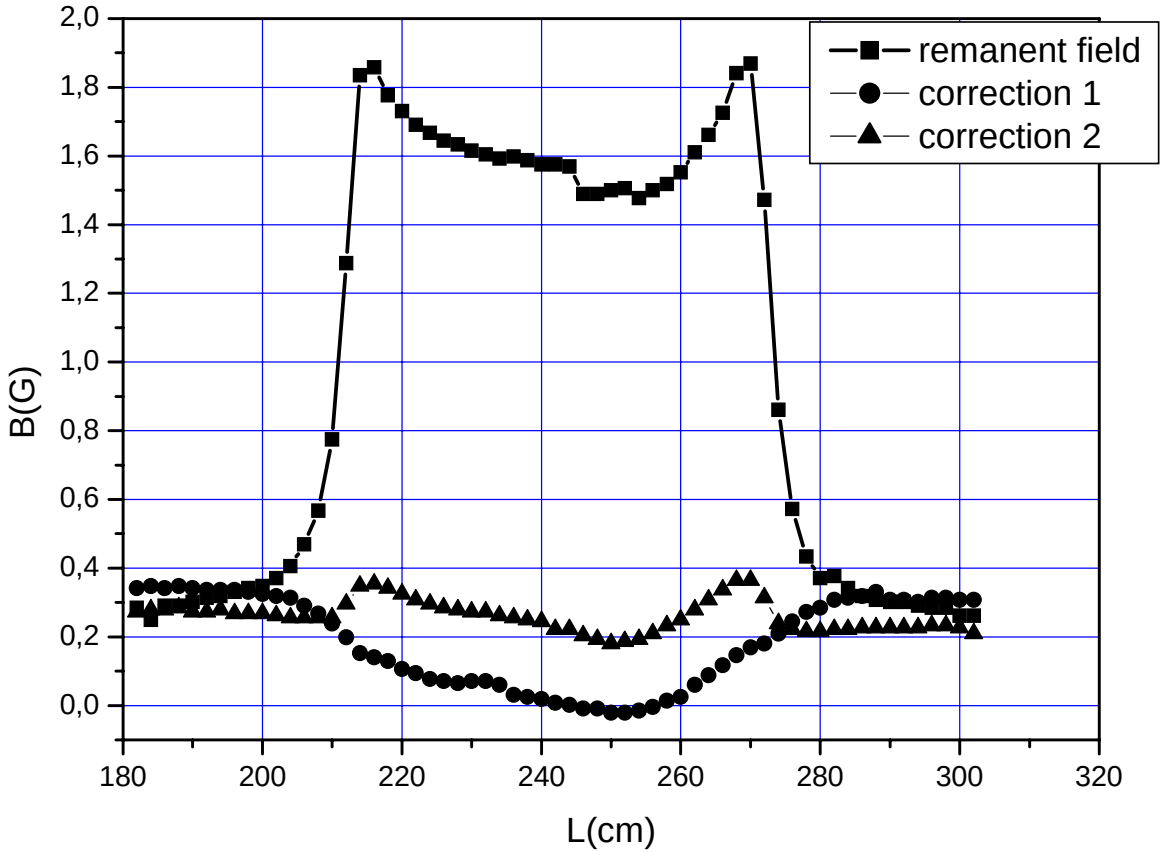
Measurement of the residual magnetic field distribution (longitudinal) near zero point

- Fluxgate magnetometer (HB0599A) was bought
- (sensitivity 0.0001 G, max. field 1 G)

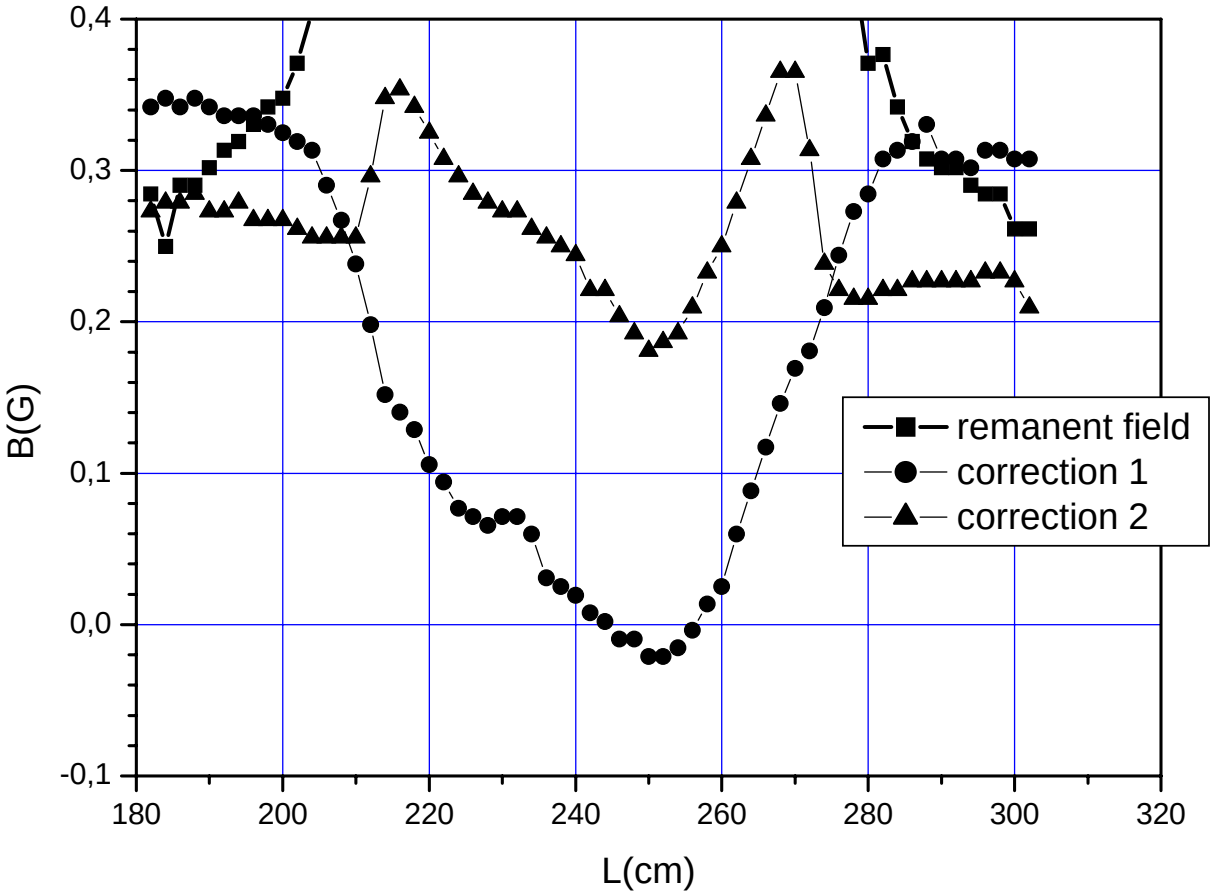
Hall probe calibration near small magnetic field



Measurement of the residual field by Hall probe for DELSY dipole magnet (gap 37 mm, iron length 600 mm)

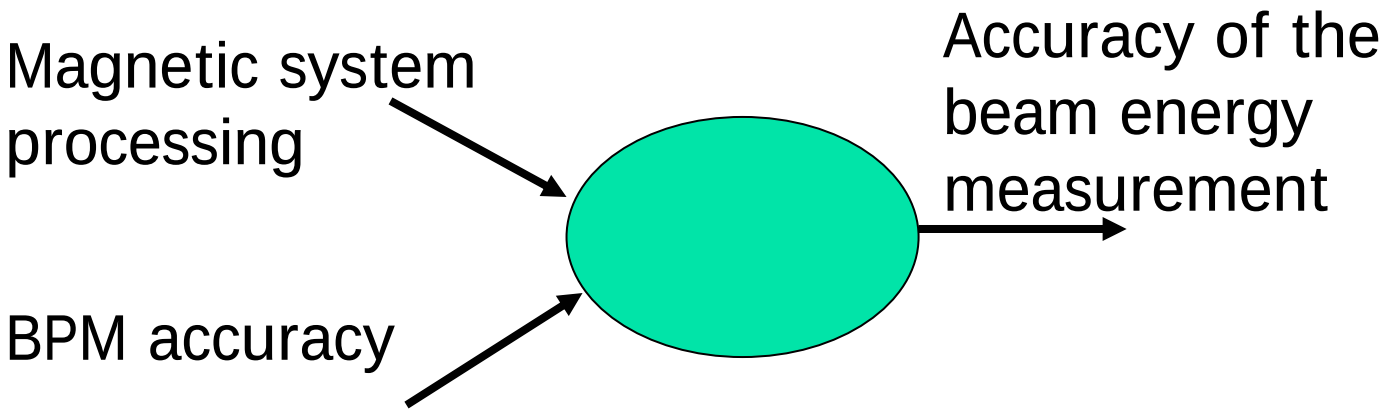


Measurement of the residual field by Hall probe for DELSY dipole magnet



Proposals for participation at the SLAC experiments

- Both sources have to be evaluated



Magnetic system processing

- magnetic field measurements of the spectrometer magnets (accuracy of the field integral 10-4 or better)
- magnetic field reproducibility (hysteresis)
- magnetic field stability (temperature effects)
- remanent field (measurements)
- background field (measurement, stability, reproducibility, screening)
- magnetic field history during beam measurement

Magnetic system proposal for ILC spectrometer (based on the prototype experience)

- magnetic system principal choice (3 or 4 magnets)
- basic parameters
- magnetic field simulation (by 3D codes)
- technical proposal

Conclusion
2006 plans

- Manufacturing and mounting of the mechanical elements for modified magnetic field measurement bench
- The same for the VWT
- Manufacturing and commissioning of new control hardware for both benches
- Test of the benches and first magnetic measurements at the test magnet

2006 plans

- Provide residual magnetic field measurements by fluxgate and Hall magnetometer for the test magnets

2006 plans

- Provide the technical proposal for new option of the spectrometer magnetic system
- Start technical design of the test magnet (if it will be approved by the collaboration)
- Participation in the SLAC experiments (if it will be approved by the collaboration)