

Study of double track resolution of the TPC using UV-laser



bmb+f

Großgeräte
der physikalischen
Grundlagenforschung



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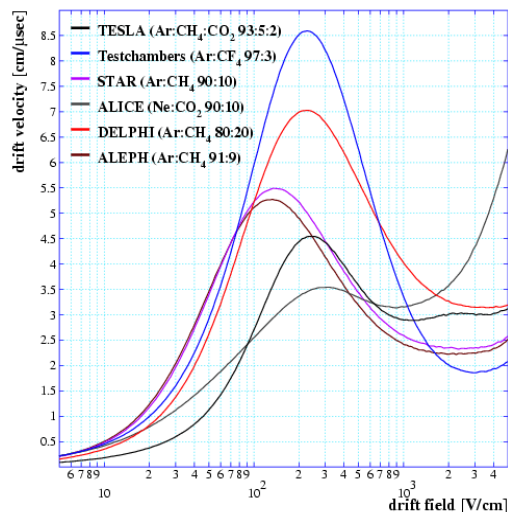


Universität
Hamburg

ILC – Meeting
1. June, 2005
Rostock

Motivation

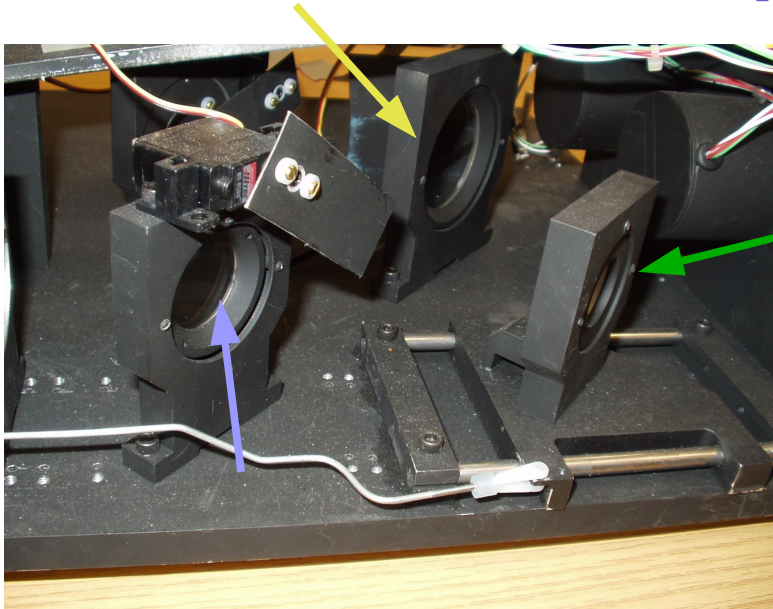
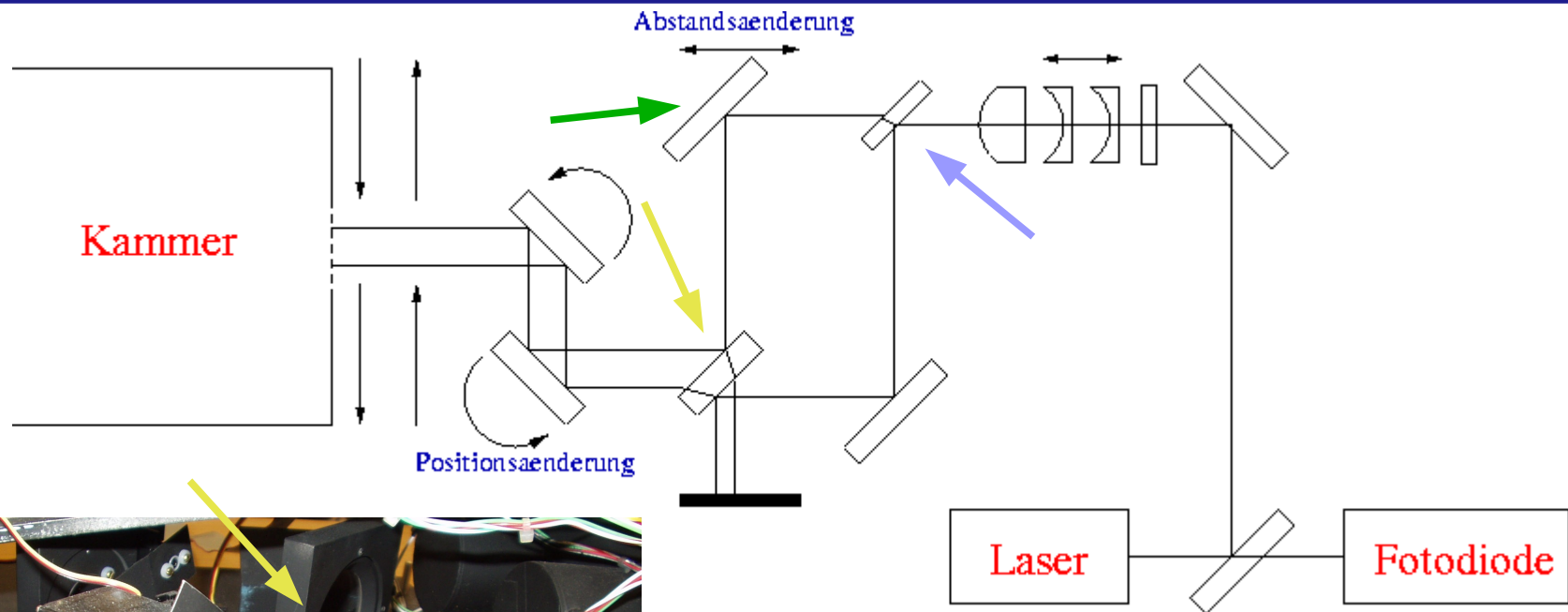
- Possibilities to produce tracks in TPC
 - Cosmic muons
 - Test beam
 - **Laser**
- Measurement of gas properties (drift velocity, Diffusion)
- Measurement of double track resolution in $r\phi$ - in high magnetic field
- Studies of 2 track fit performance



Features of NdYAG-Lasers:

- Wavelength: $\lambda = 266 \text{ nm}$
 - $h\nu = 4.66 \text{ eV}$
- Max. frequency of laser 20 Hz
- Max. energy of pulse 3 mJ
- Length of pulse $< 6 \text{ ns}$
- \emptyset of laser beam approx. 1.5 mm
- Divergency $< 1 \text{ mrad}$

Victoria Laser-System

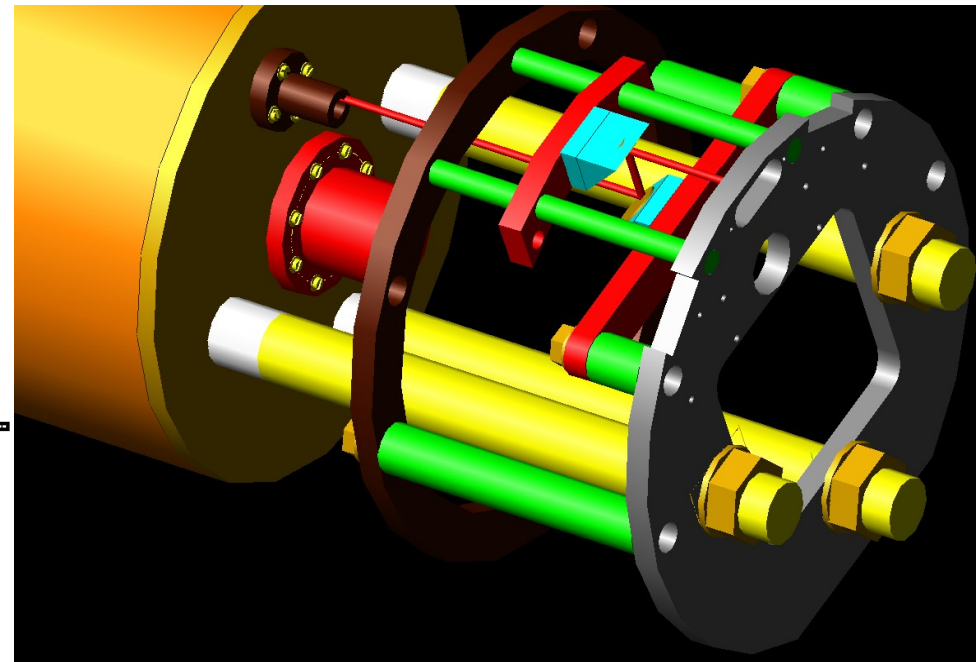
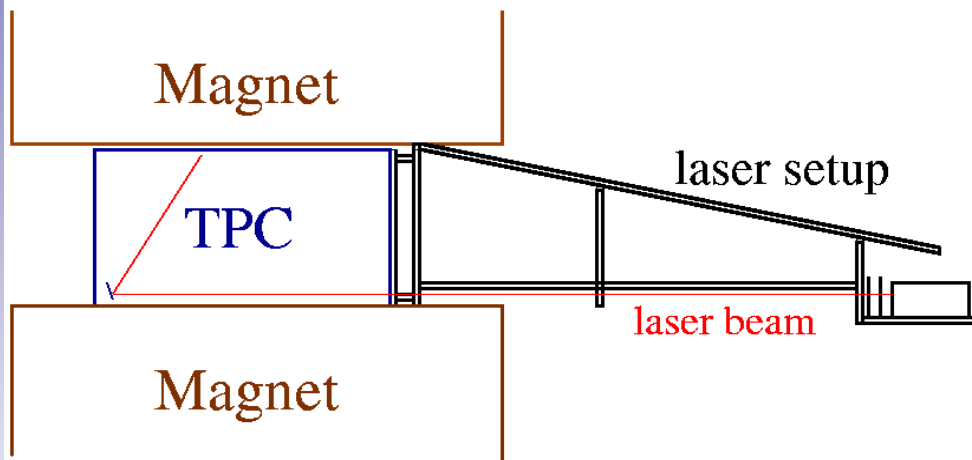


- System for production of **two parallel** laser beams
- Varying distance between laser beams in xy

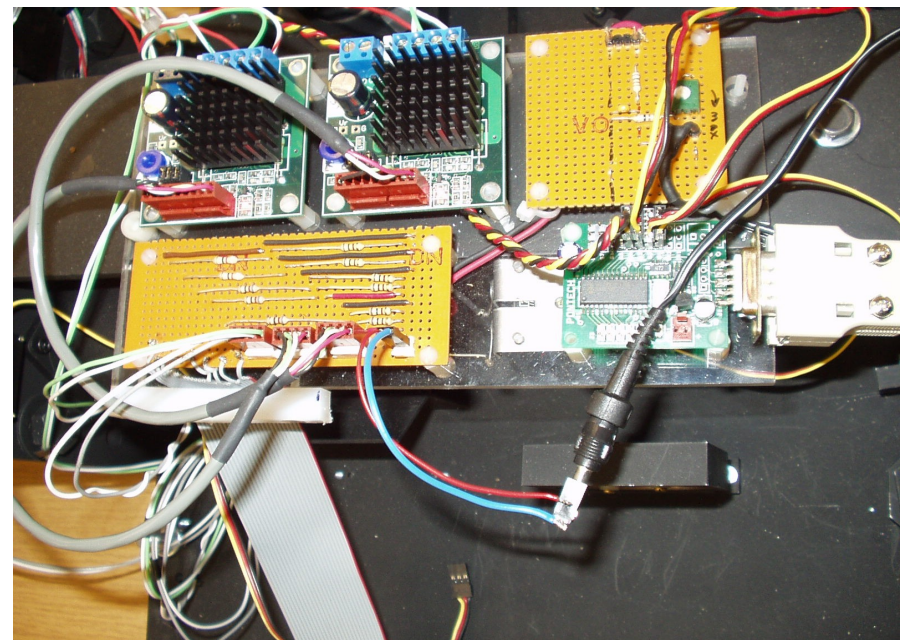
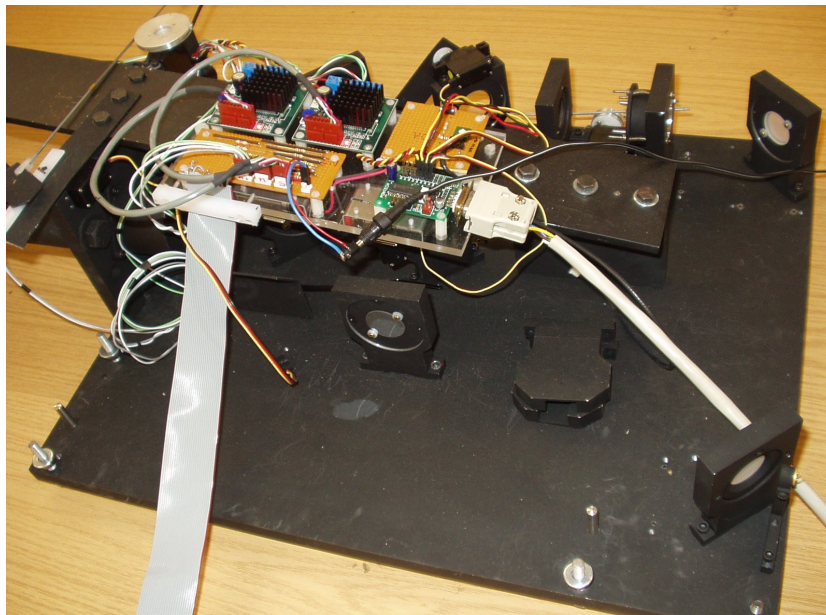
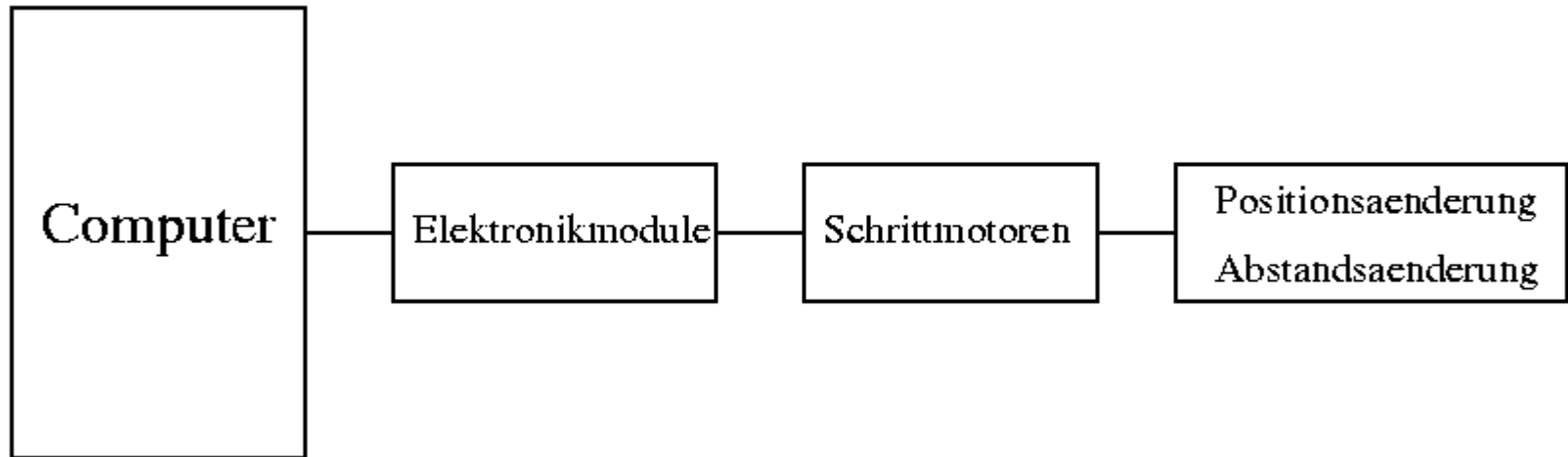
- Successful data taking last summer here at Desy - Magnet
- Modification of the setup has to be done to use it for our TPC – setup

Using laser setup together with Medi TPC

- Essential issues
 - Put TPC in homogeneous magnetic field
 - Stability of connection: laser setup – Medi TPC
 - Possibly small number of changes in laser setup to reach this aim (stable connection with Medi TPC)
 - Alignment of laser beam



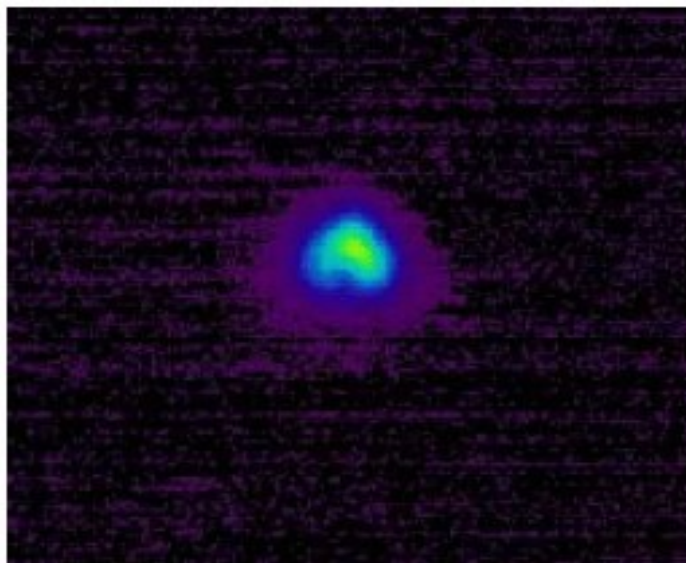
Victoria Setup



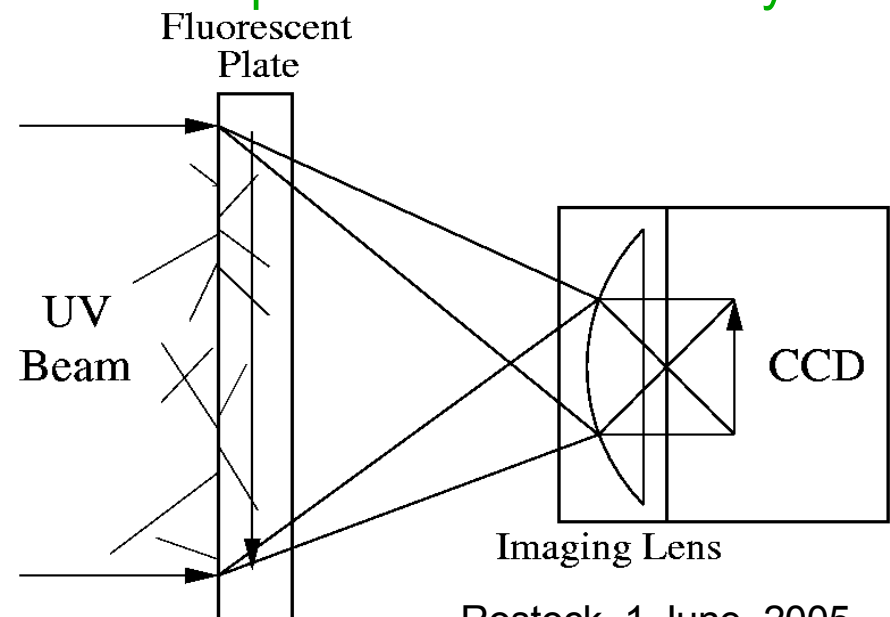
Monitoring of laser beam

In contrast to a MIP, a laser beam has a certain width.

- Which issues are important for measuring beam profile?
 - Precision ($\sim 100\mu\text{m}$)
 - Cost
 - Time
- How we can measure width of laser profile?
 - First try: CCD – array of a WebCam
 - Advanced try: combination of a fluorescent plate with CCD – array



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Conclusions and outlook

- Development of lasersetup for measurement of double track resolution and double track fit performance under way
- Beam size monitoring of laser beam
- Plans: Measurement of 2 track resolution in high B – field (up to 5.3T)

Probe with WebCam & lattice

