

CLIC - PRAL

Mini Workshop

02.-03.04.2009

WPS and other alignment stuff

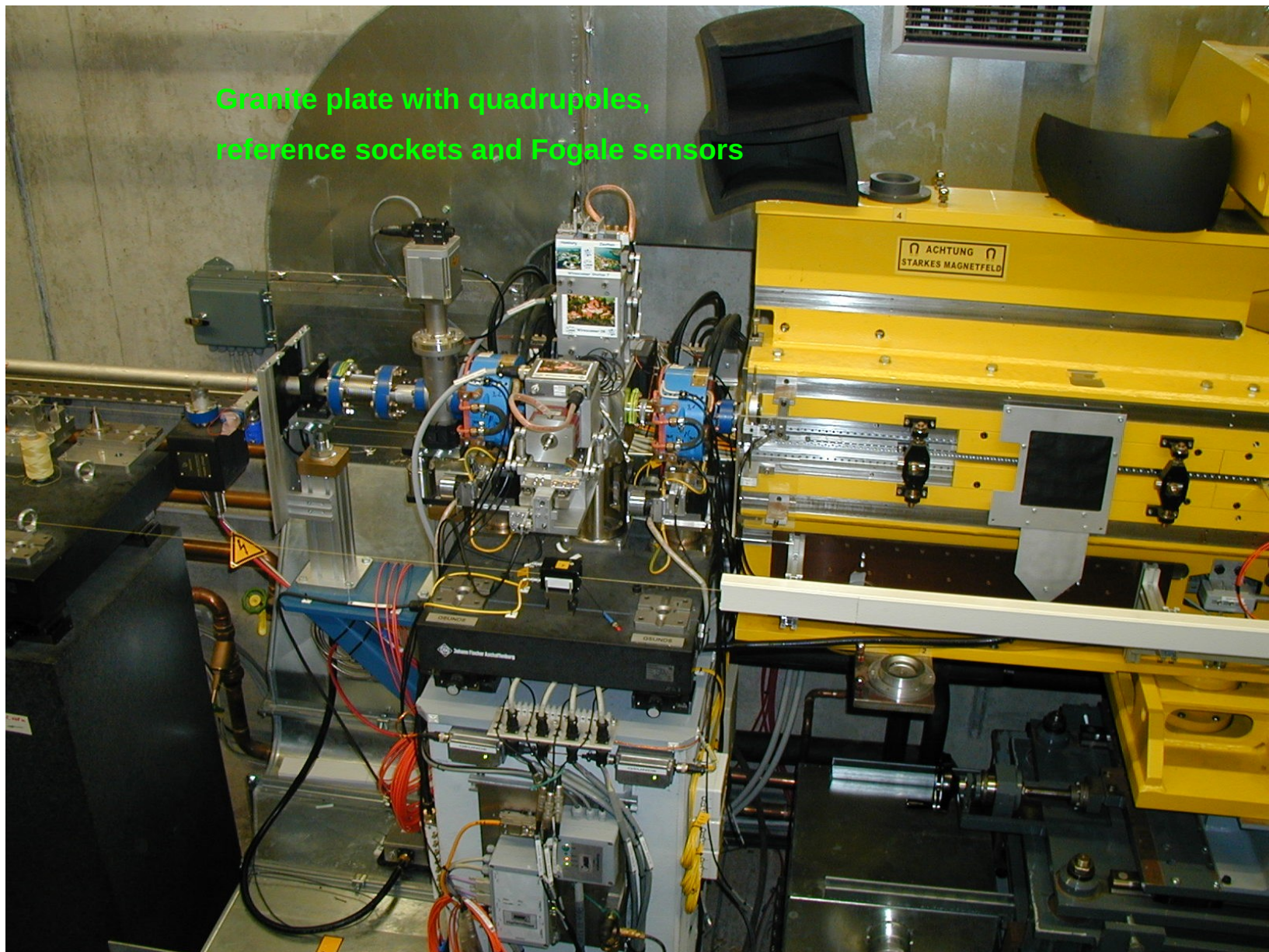
Johannes J. Prenting,
Deutsches Elektronen-Synchrotron
DESY, MEA2

31.03.2009 - 16:42





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Granite plate with quadrupoles,
reference sockets and Fögle sensors

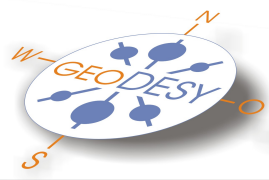
Stretched Wire
Installation

Software
enhancements

SLRS
Prototype

Tests of
algorithm

Further
development



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Stretched Wire Installation

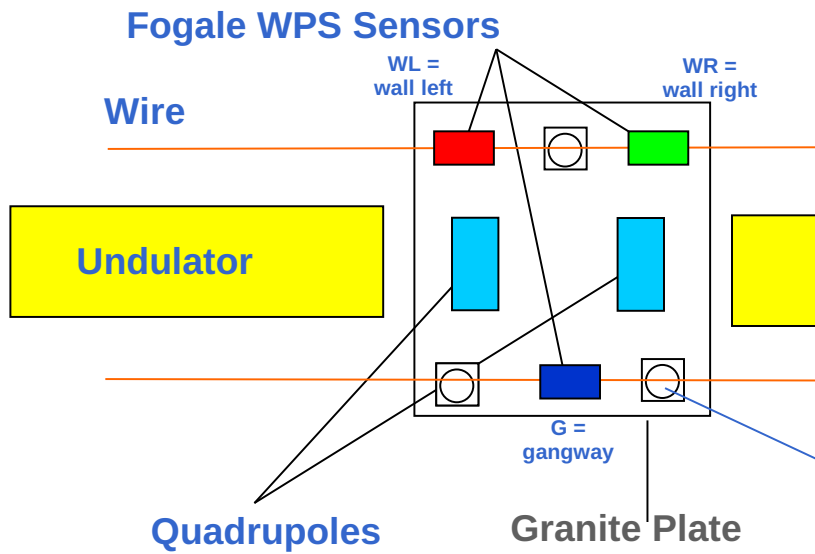
Absolute alignment possible due to Wire Finder plus levelling instrument.
Permanent relative measurements with Fogale sensors.

Software enhancements

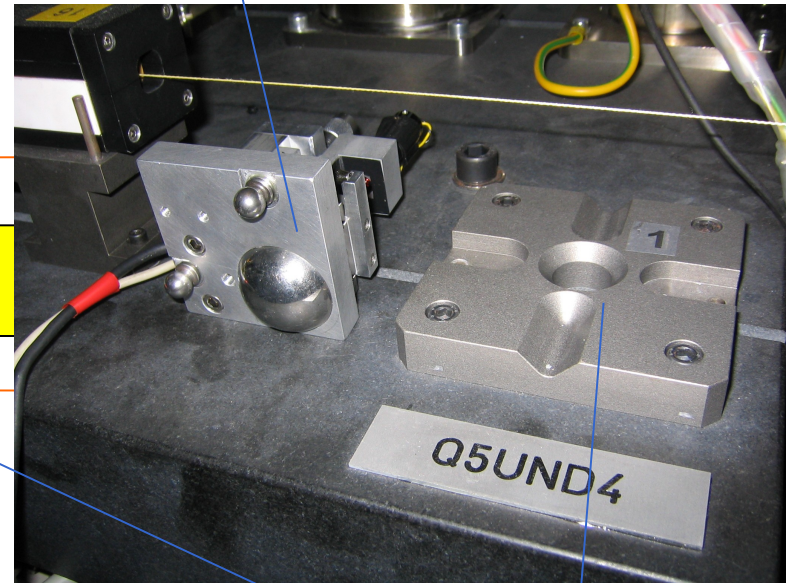
SLRS Prototype

Tests of algorithm

Further development



Wire Finder with kinematic mount, developed @ SLAC

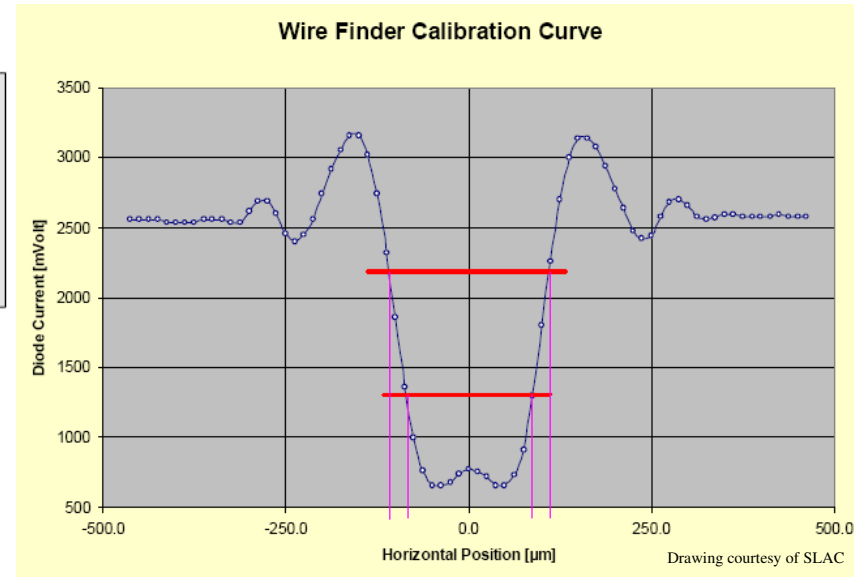
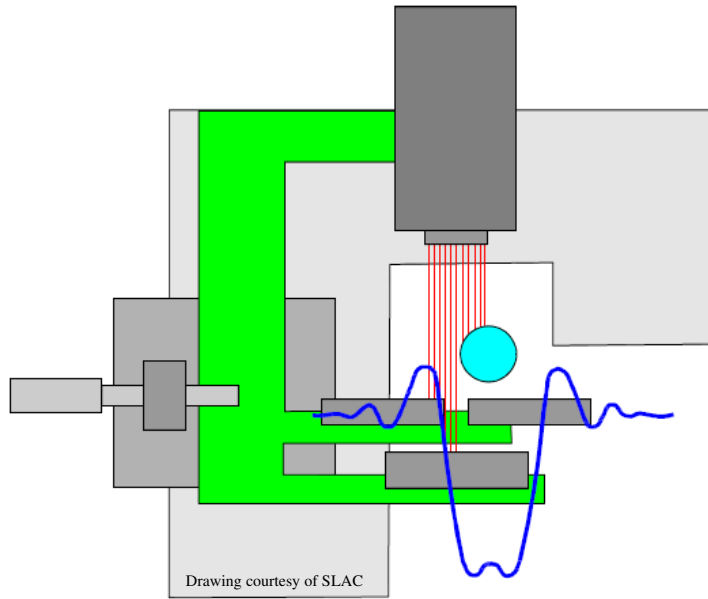


Reference socket with kinematic mount



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Stretched Wire Installation

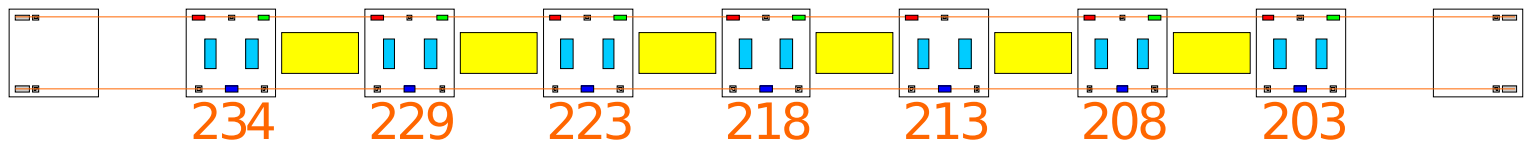


Software enhancements

SLRS Prototype

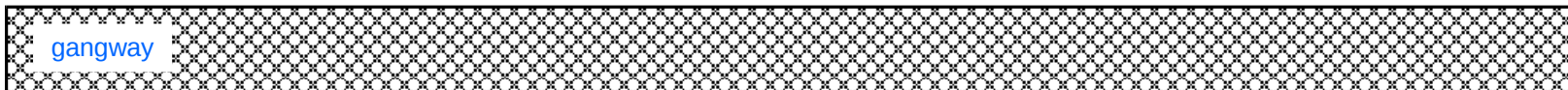
wall

Tests of algorithm



gangway

Further development





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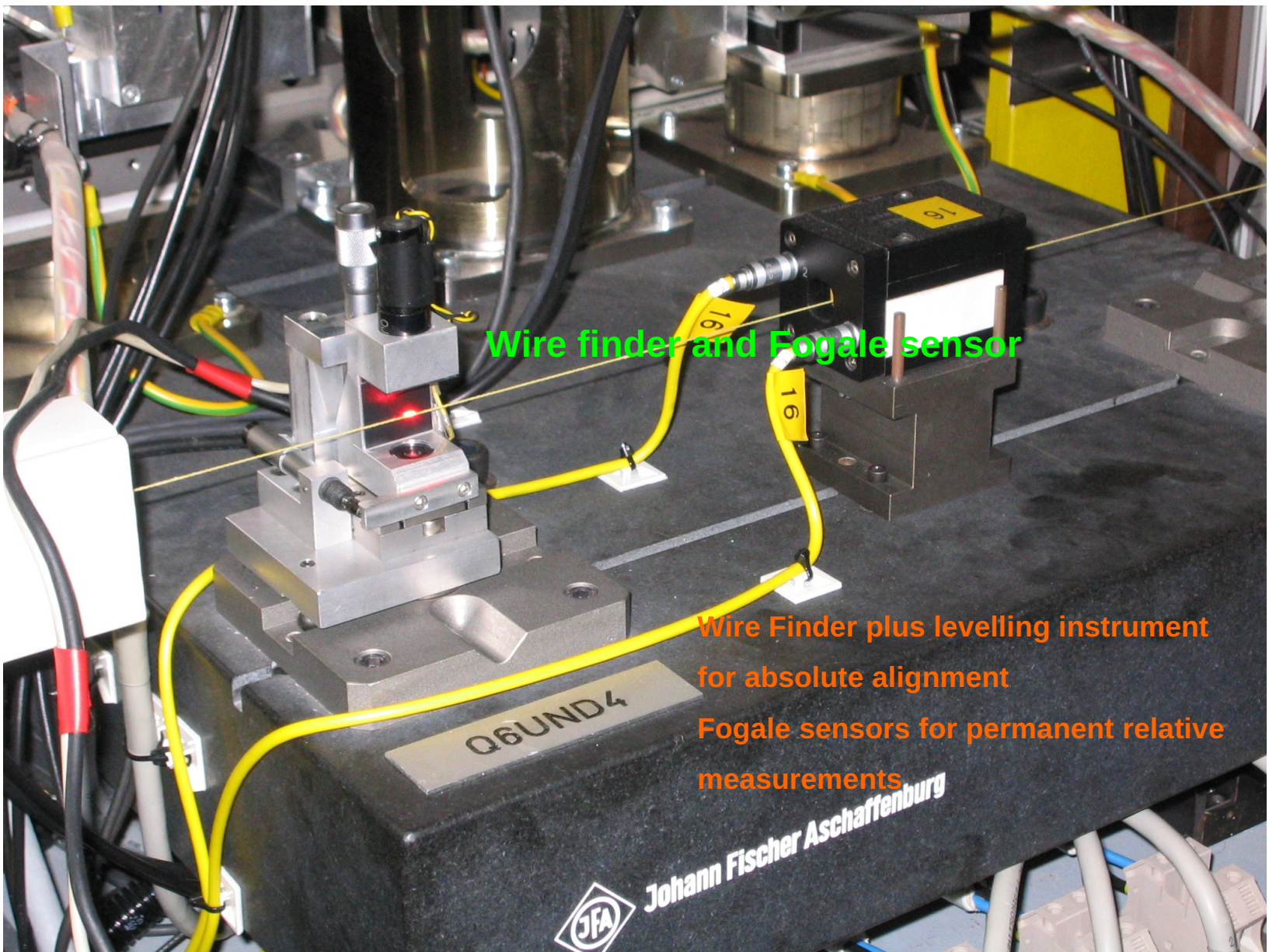
Stretched Wire Installation

Software enhancements

SLRS Prototype

Tests of algorithm

Further development



Wire finder and Fogale sensor

Wire Finder plus levelling instrument for absolute alignment
Fogale sensors for permanent relative measurements

JFA Johann Fischer Aschaffenburg

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drahtmess4.vi

Datei Bearbeiten Anzeigen Projekt Ausführen Werkzeuge Fenster Hilfe

Bewegung überwachter Granitplatten in FLASH (Drahtmesssystem)

Hinweis:

Die hier berechneten Transformations-Parameter beziehen sich immer auf Bewegungen der Platten im Vergleich zum ersten Datensatz in der Datei!

Von Datum

1 1 2008

Bis Datum

7 1 2008

Dateien laden

Einzeldatei laden

Startzeit

00:30:24

Endzeit

23:48:26

Granitplatte wählen

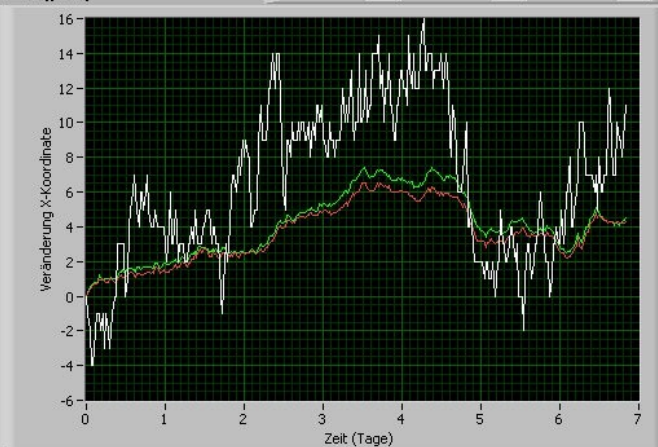
Platte 1 (208m)

Vergleichen...

EXIT

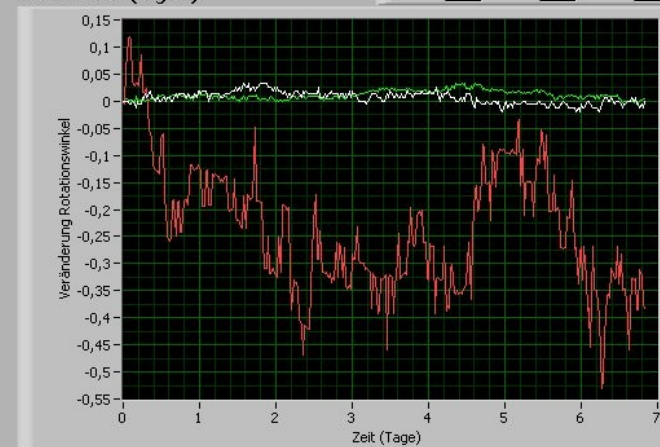
ΔX (μm)

WPS2D-20 WPS2D-17 WPS2D-19



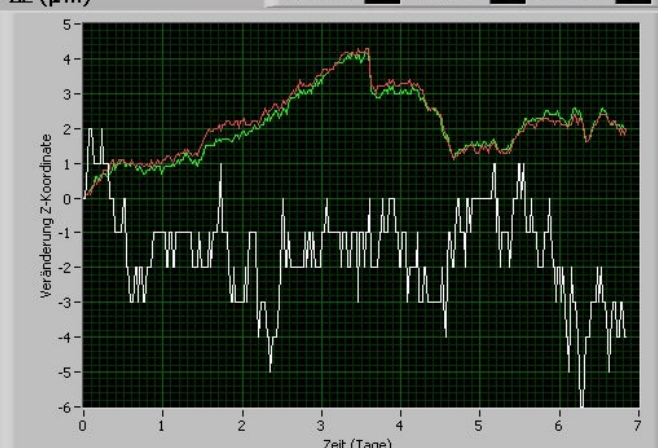
Rotationen (mgon)

phi theta psi



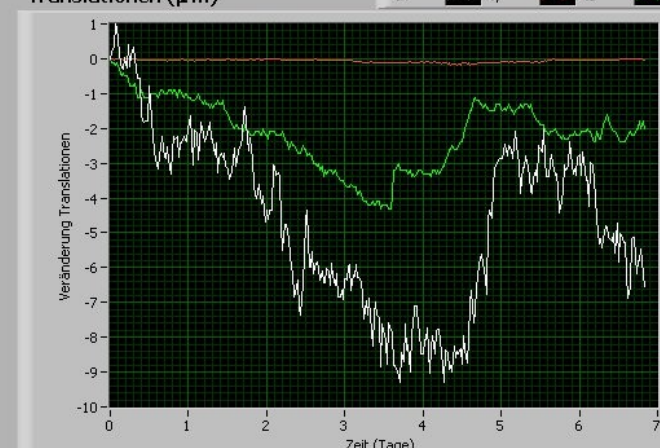
ΔZ (μm)

WPS2D-20 WPS2D-17 WPS2D-19



Translationen (μm)

tx ty tz



Stretched Wire Installation

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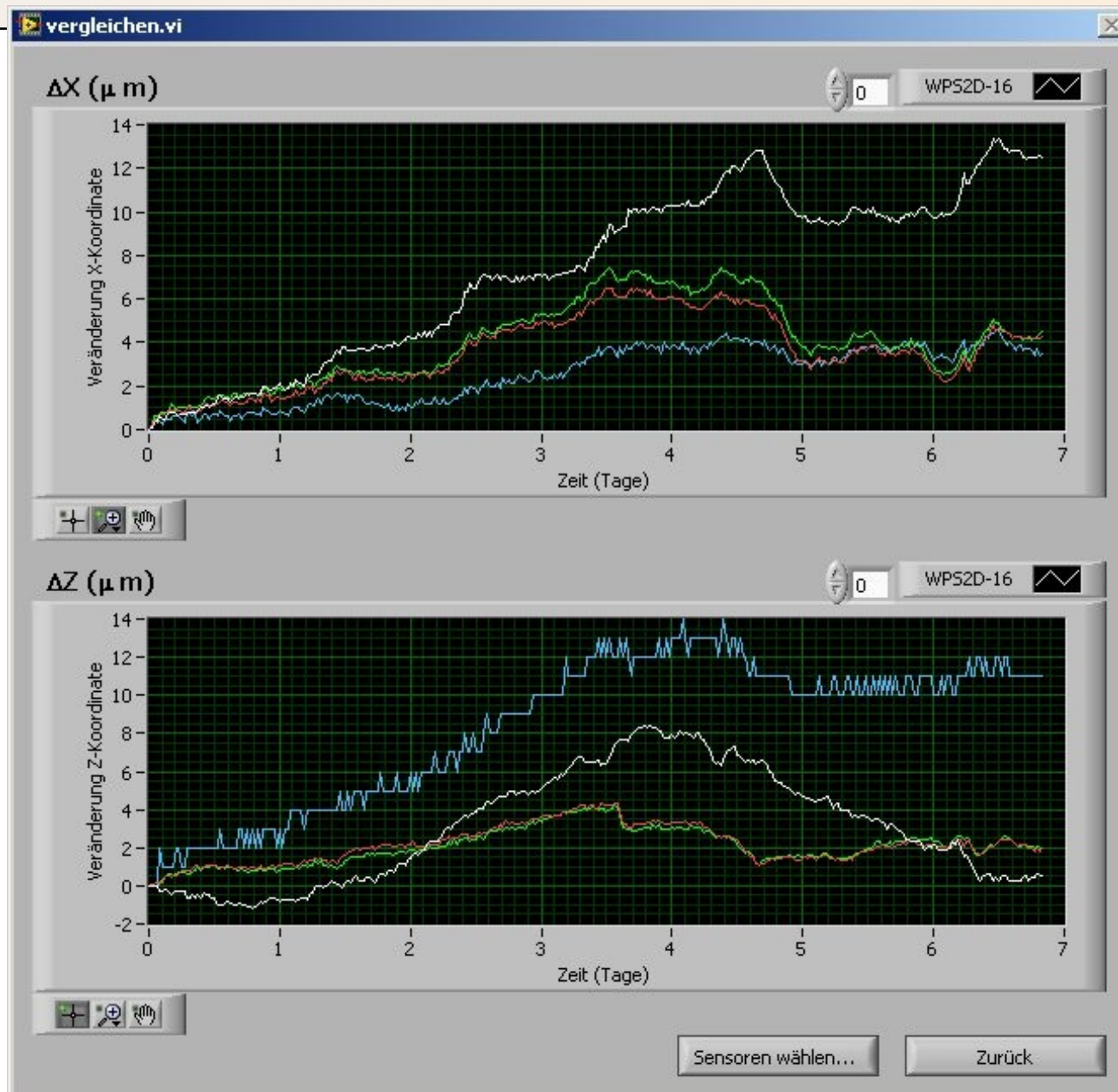
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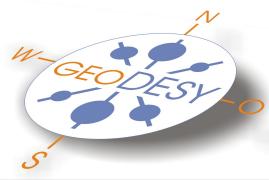
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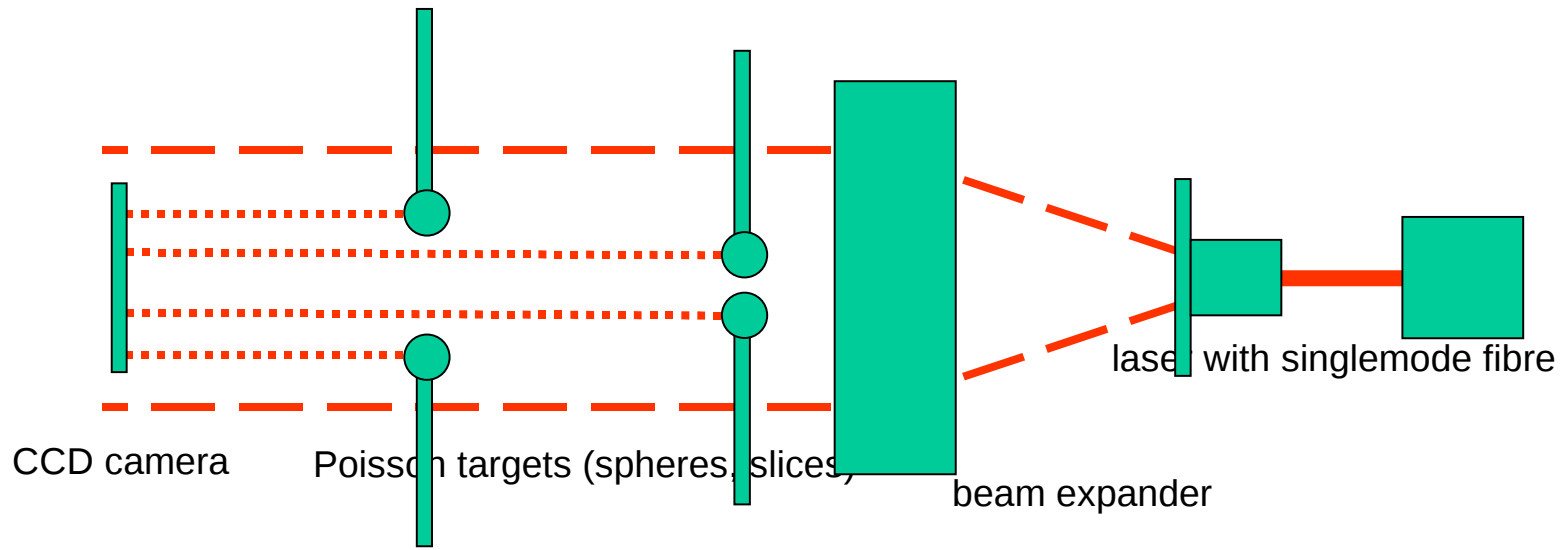
Stretched Wire Installation

Measurement systems that avoid the effects of refraction: Straight Line Reference Systems (SLRS) with optical reference line

Proposal: simple alignment system
with optical reference line
that works both in x and y direction
(height and transverse) :

Software enhancements

Assembly of the Poisson Alignment System :



SLRS Prototype

Tests of algorithm

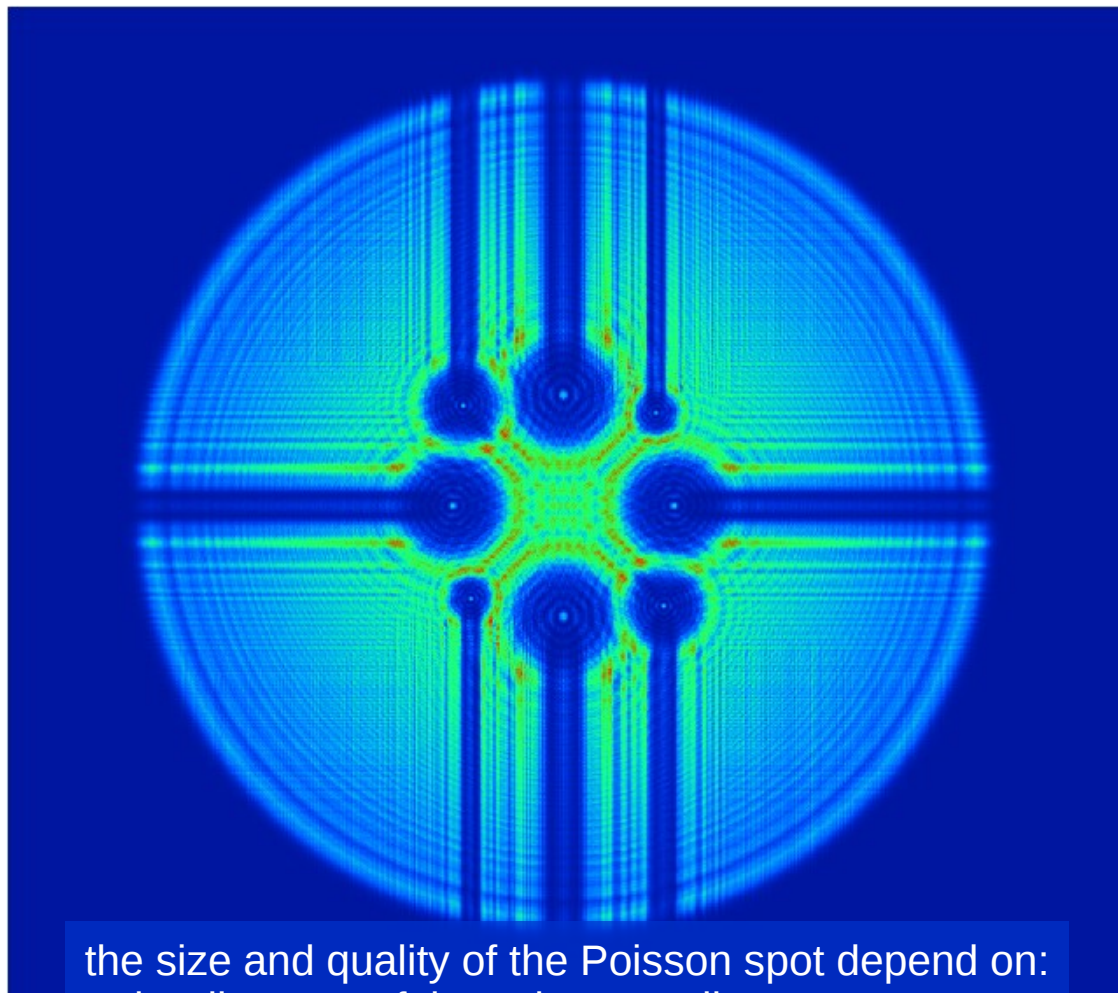
Further development

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Measurement systems that avoid the effects of refraction: Straight Line Reference Systems (SLRS) with optical reference line

Various states of
simulated (ZEMAX)
images of a
Poisson
Alignment System



the size and quality of the Poisson spot depend on:

- the diameter of the sphere or slice
- their respective distance to the detector

Stretched Wire
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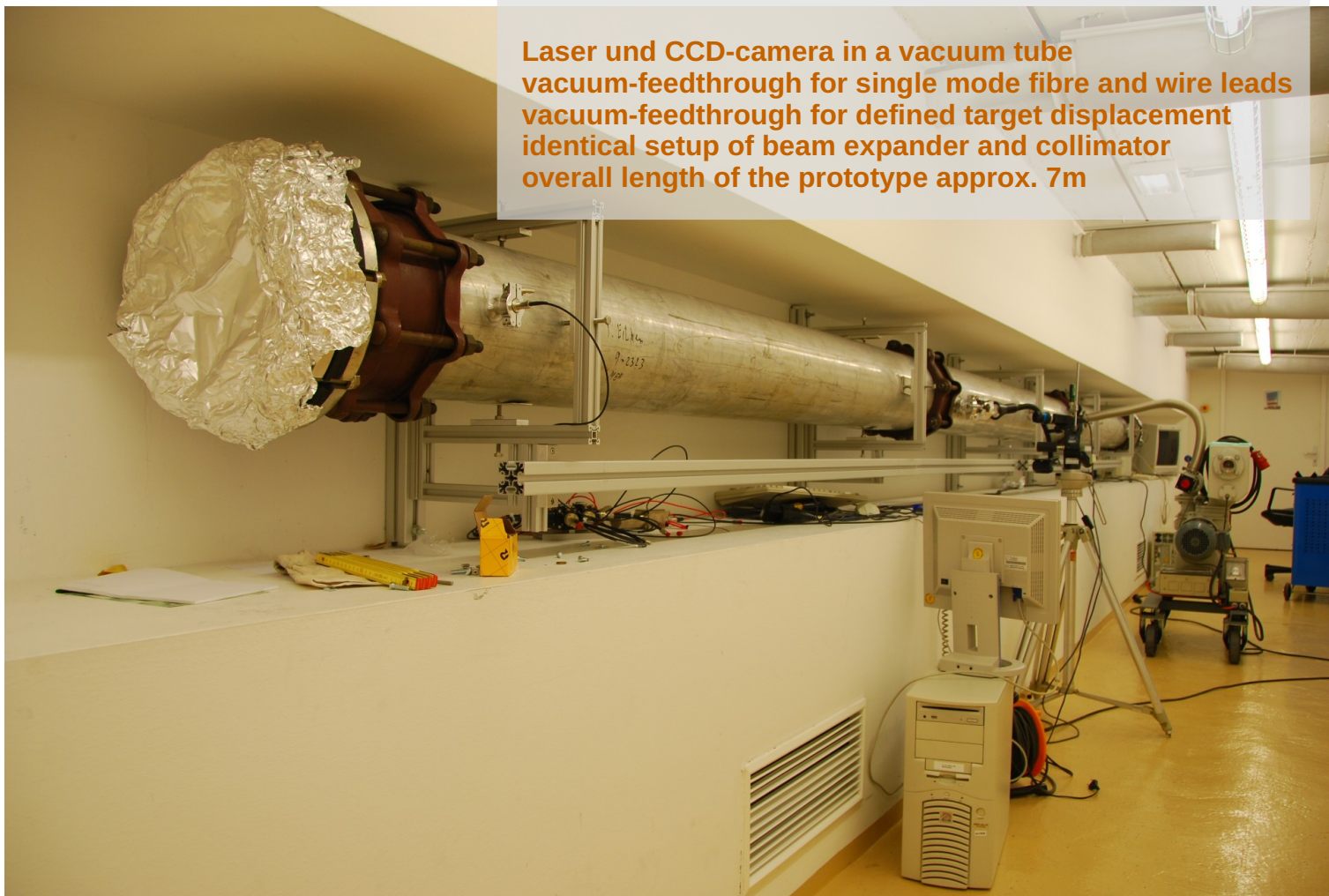


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Measurement systems that avoid the effects of refraction: Straight Line Reference Systems (SLRS) with optical reference line

2nd prototype:

Laser und CCD-camera in a vacuum tube
vacuum-feedthrough for single mode fibre and wire leads
vacuum-feedthrough for defined target displacement
identical setup of beam expander and collimator
overall length of the prototype approx. 7m



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Measurement systems that avoid the effects of refraction: Straight Line Reference Systems (SLRS) with optical reference line

3rd prototype:
rigid flanges and gaskets
v2a tubing with standardized diameter



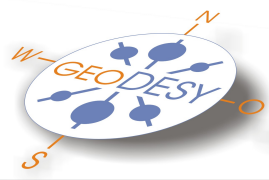
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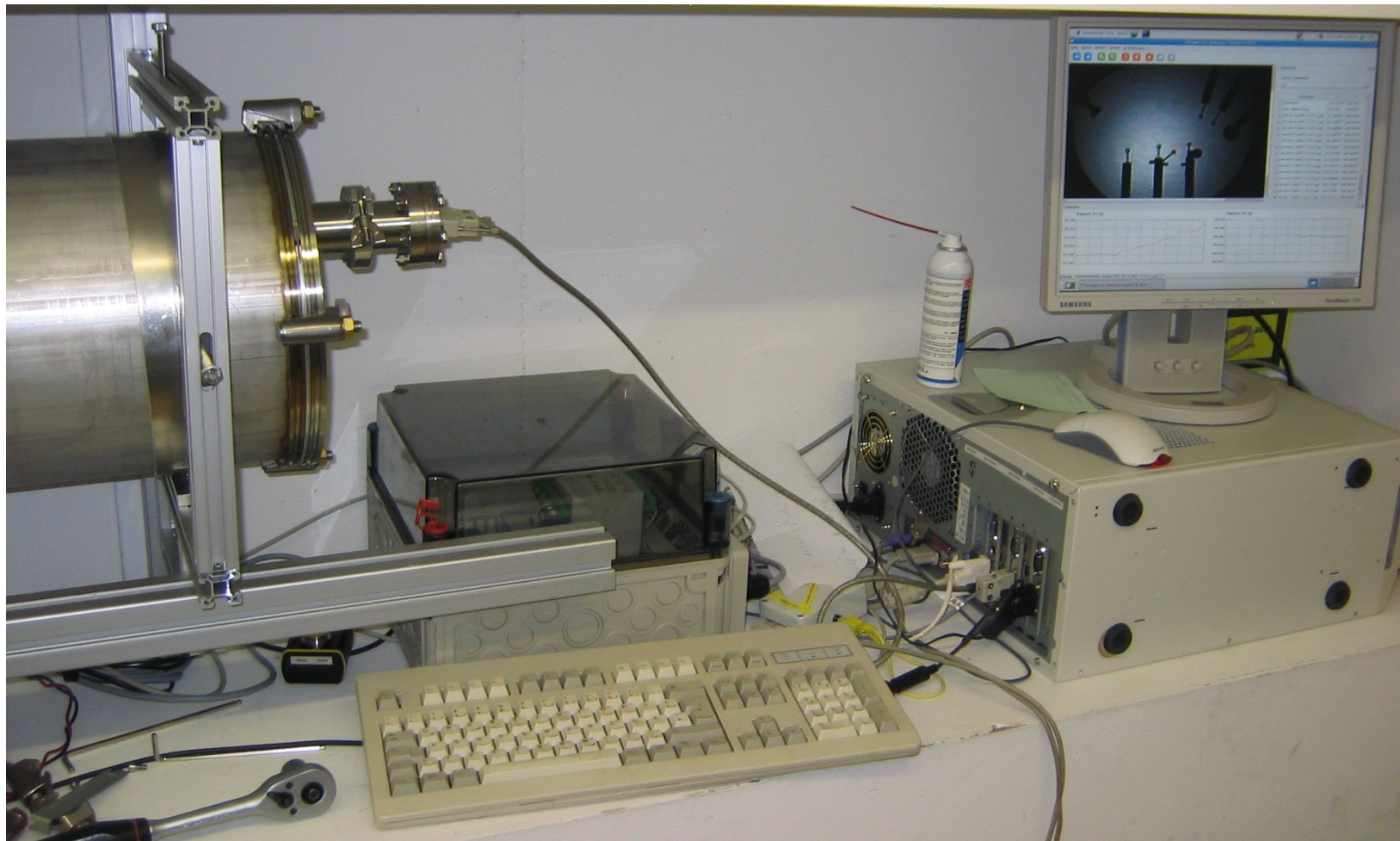
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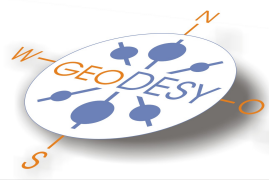
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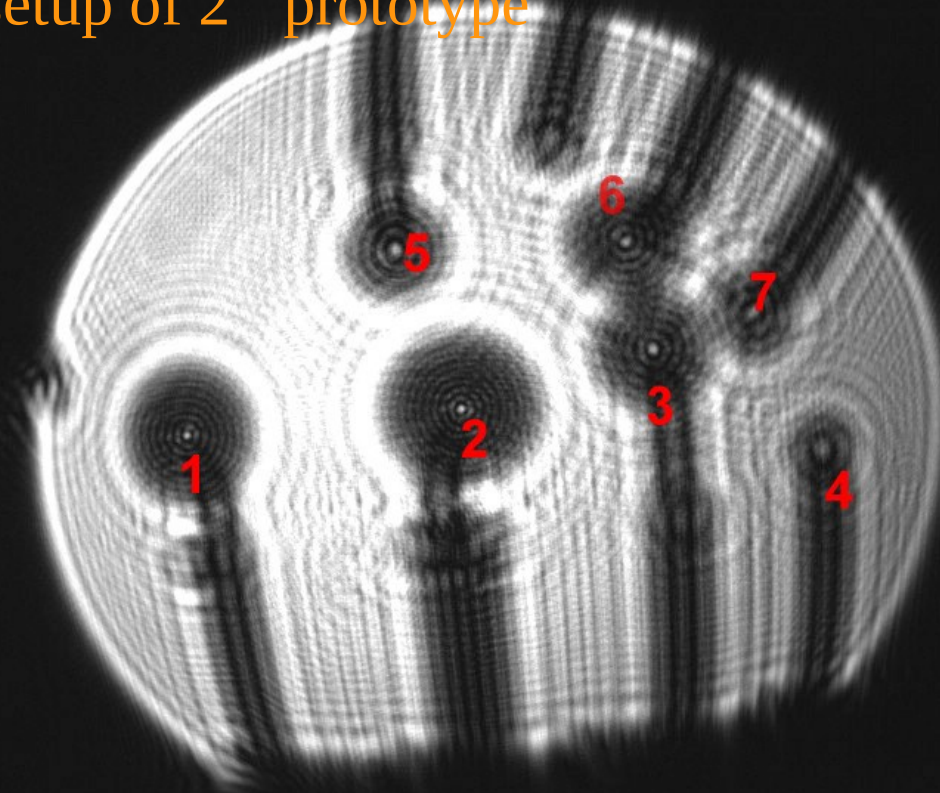
Software
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Image from setup of 2nd prototype



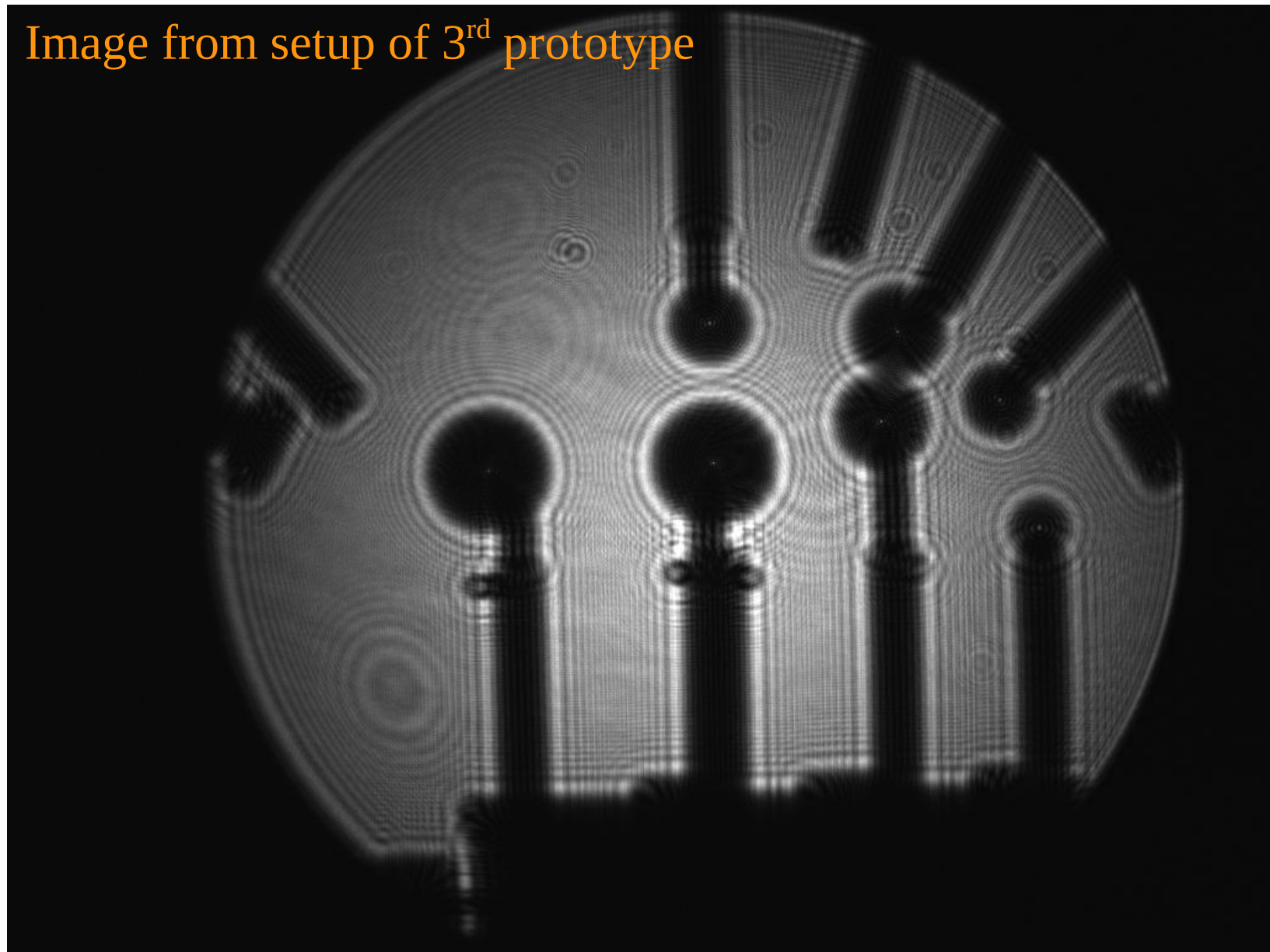
video of evacuation of prototype tube

demonstration of measurement software

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Image from setup of 3rd prototype



Stretched Wire
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Special targets for testing of algorithm

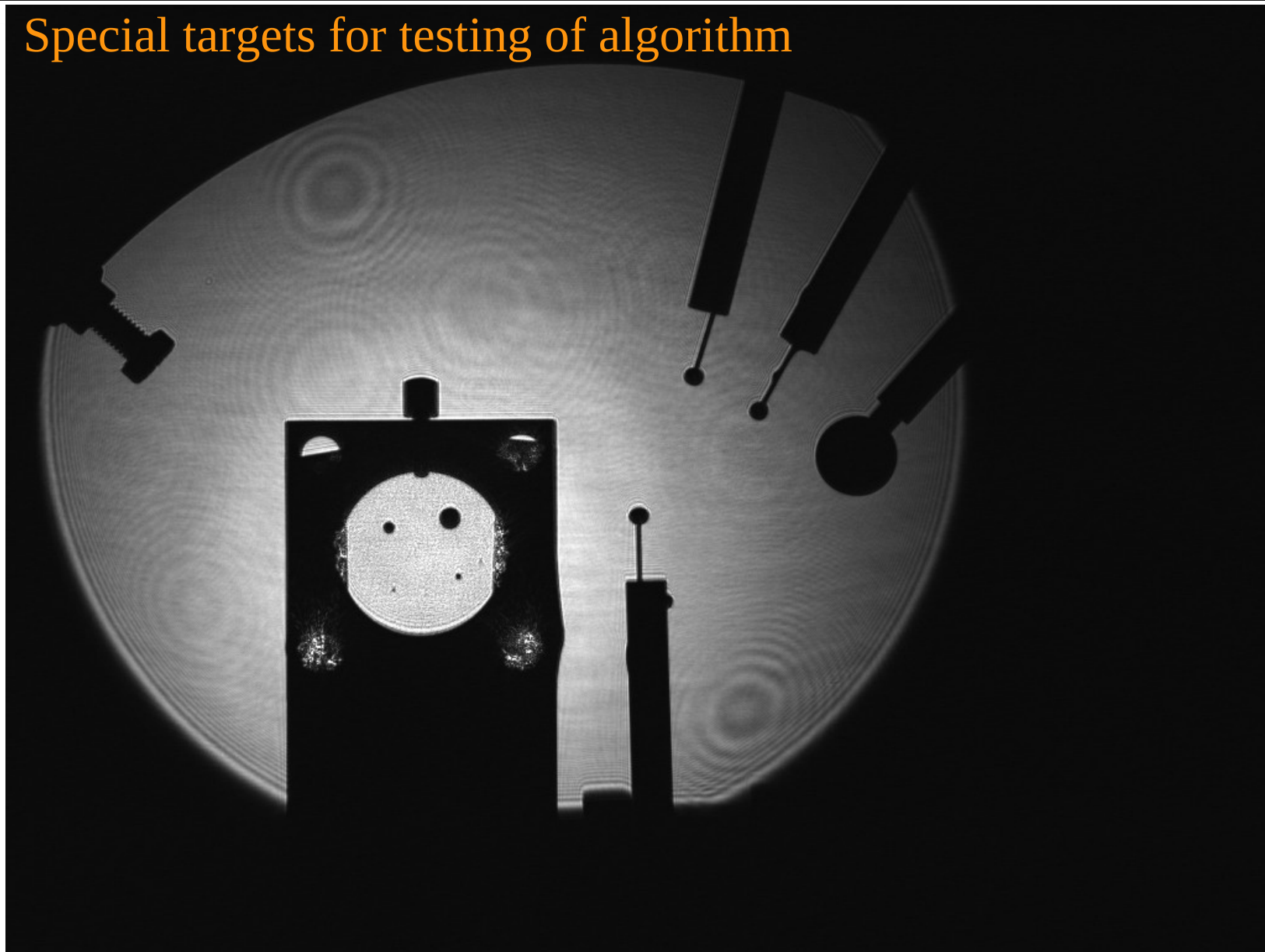
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Special targets for testing of algorithm

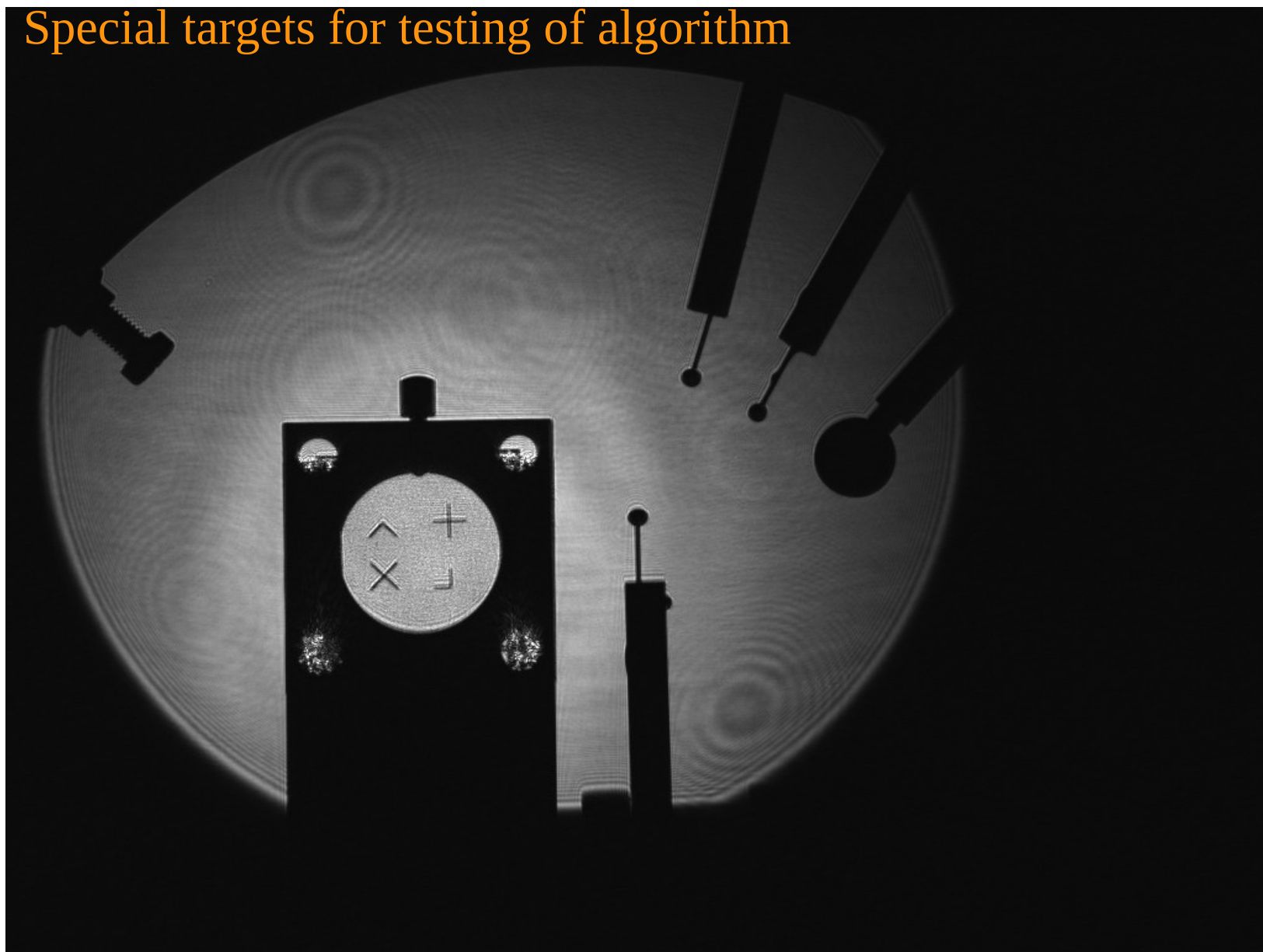
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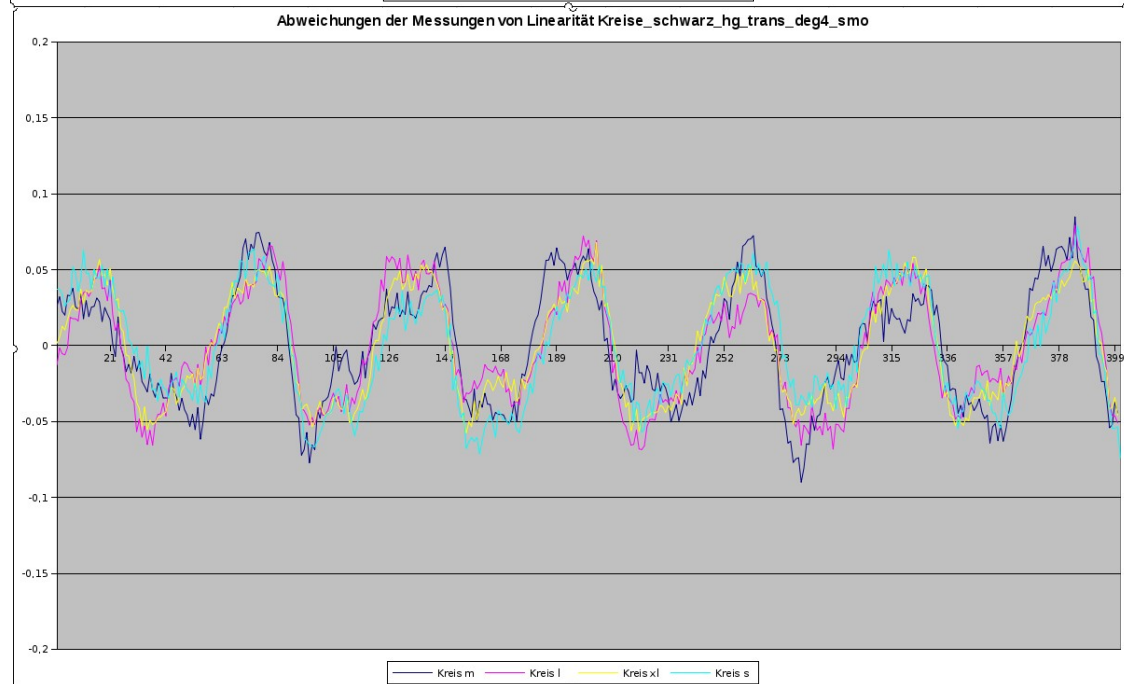
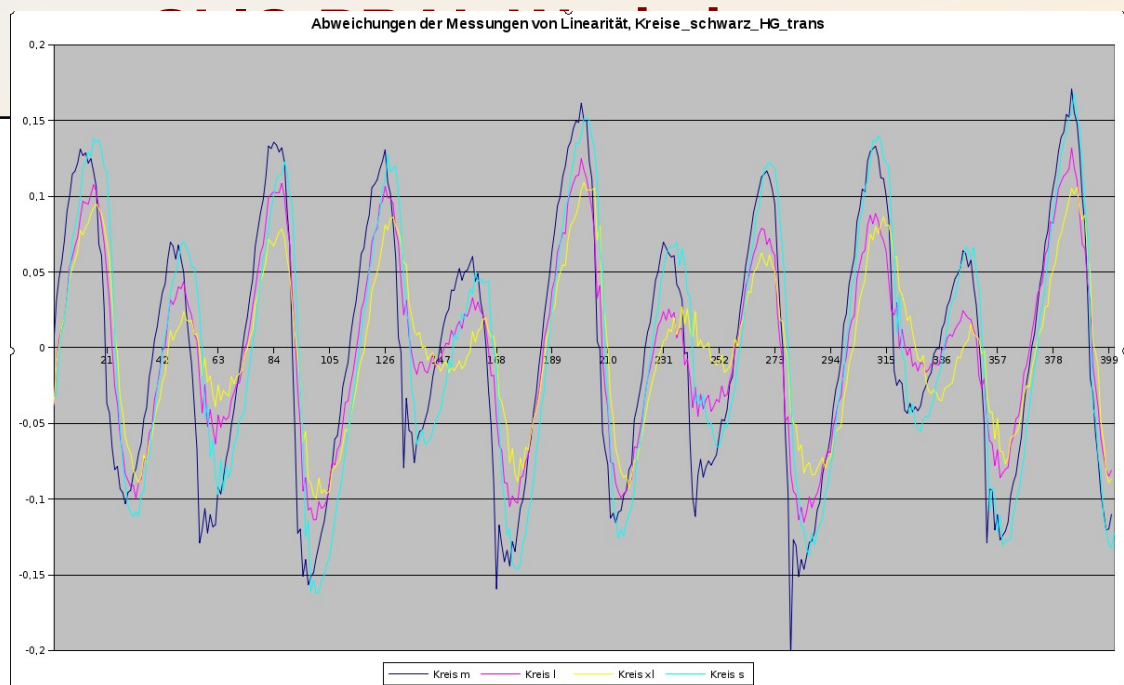
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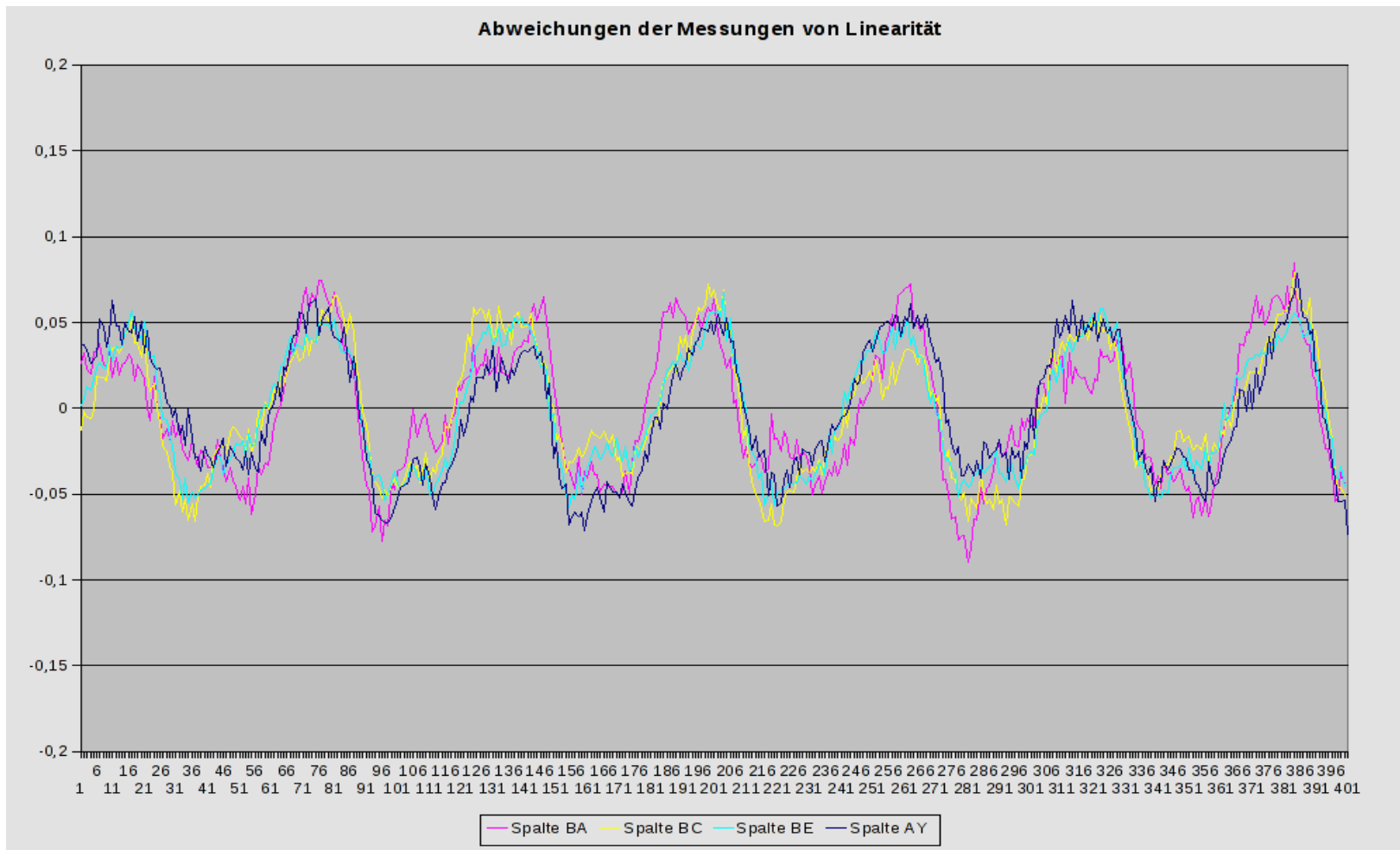
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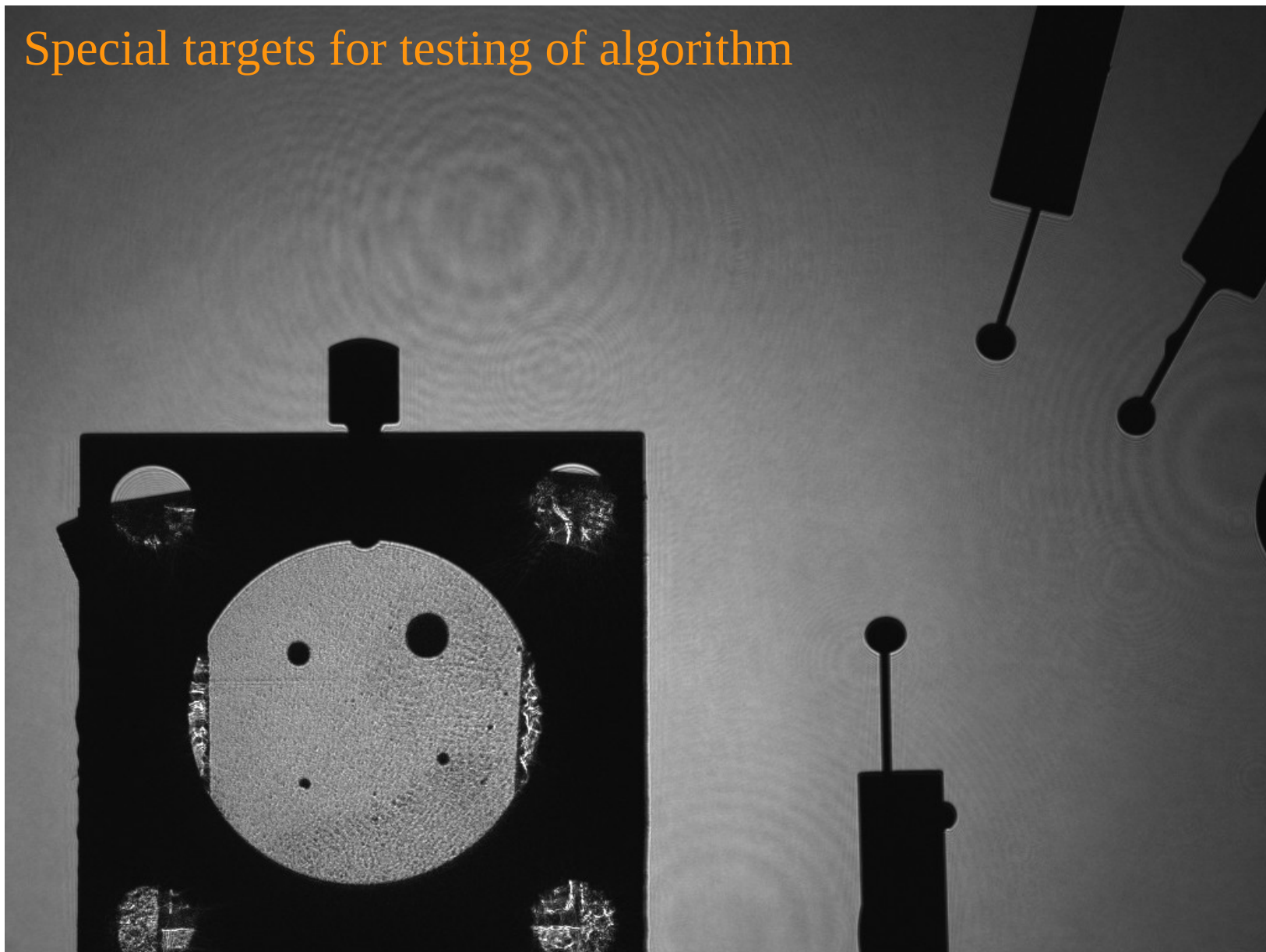
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Special targets for testing of algorithm





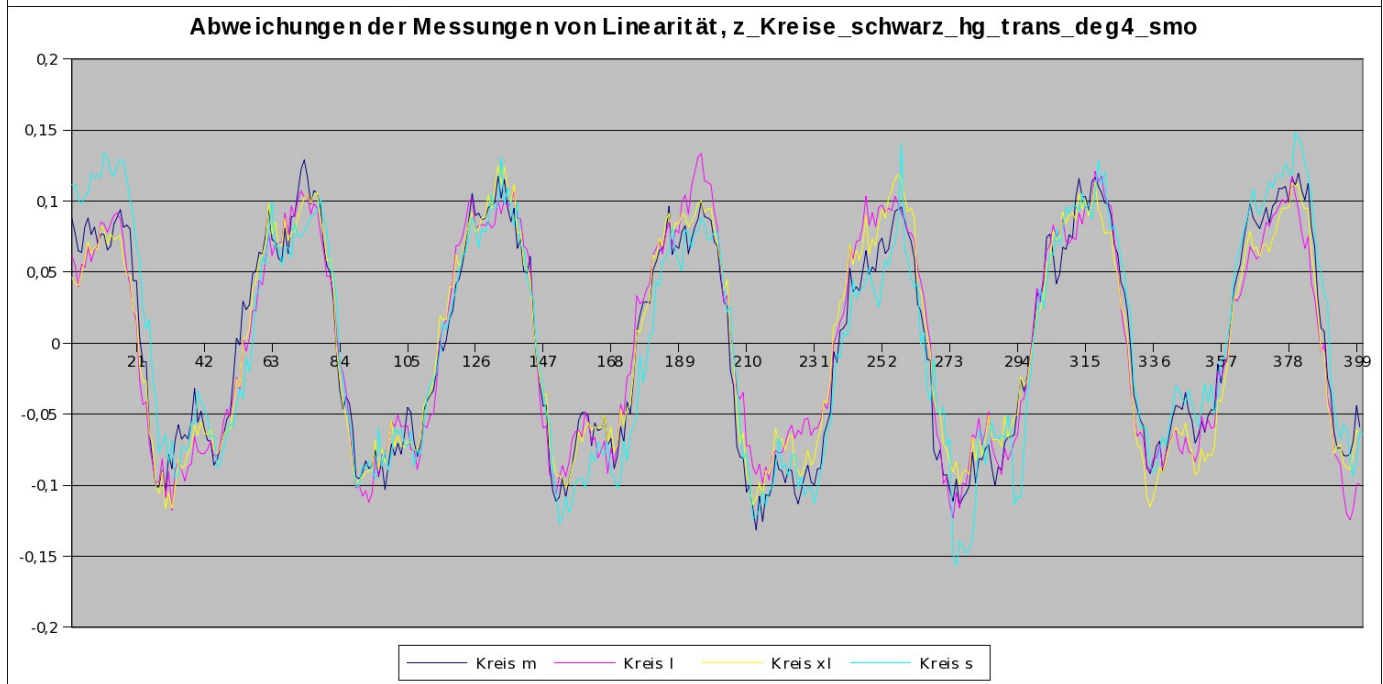
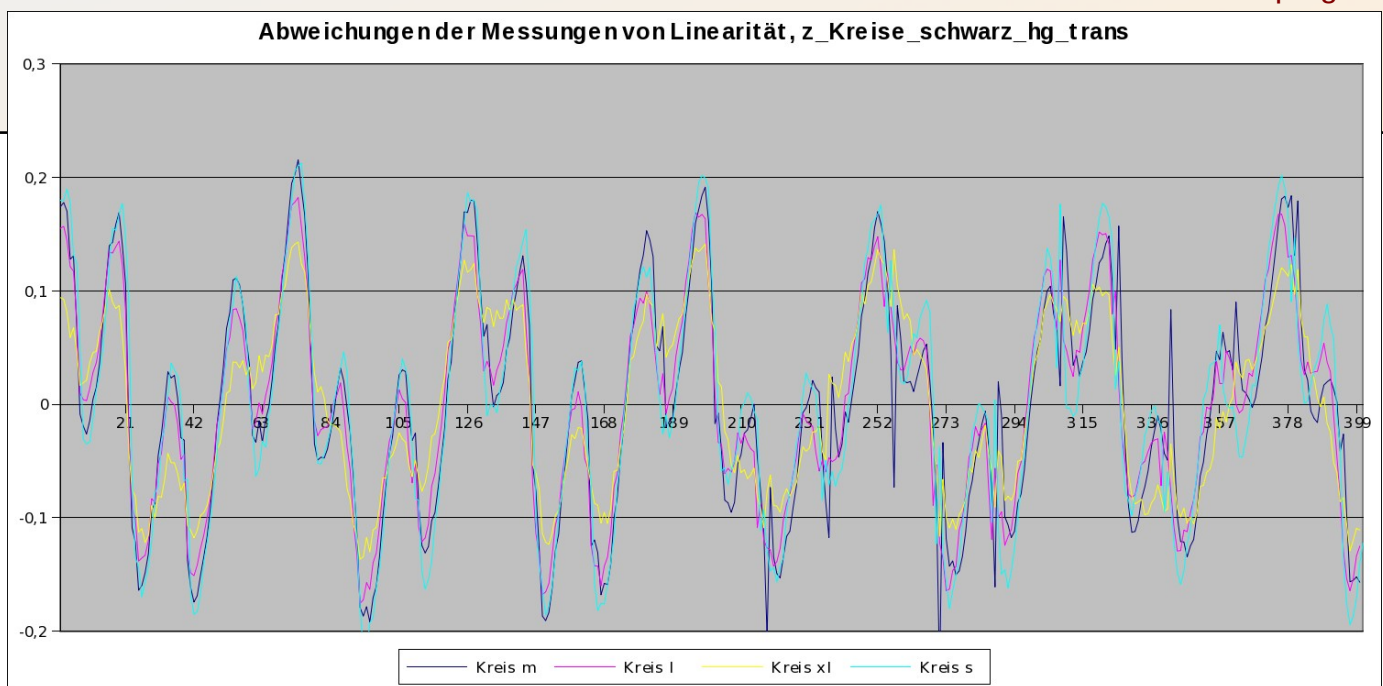
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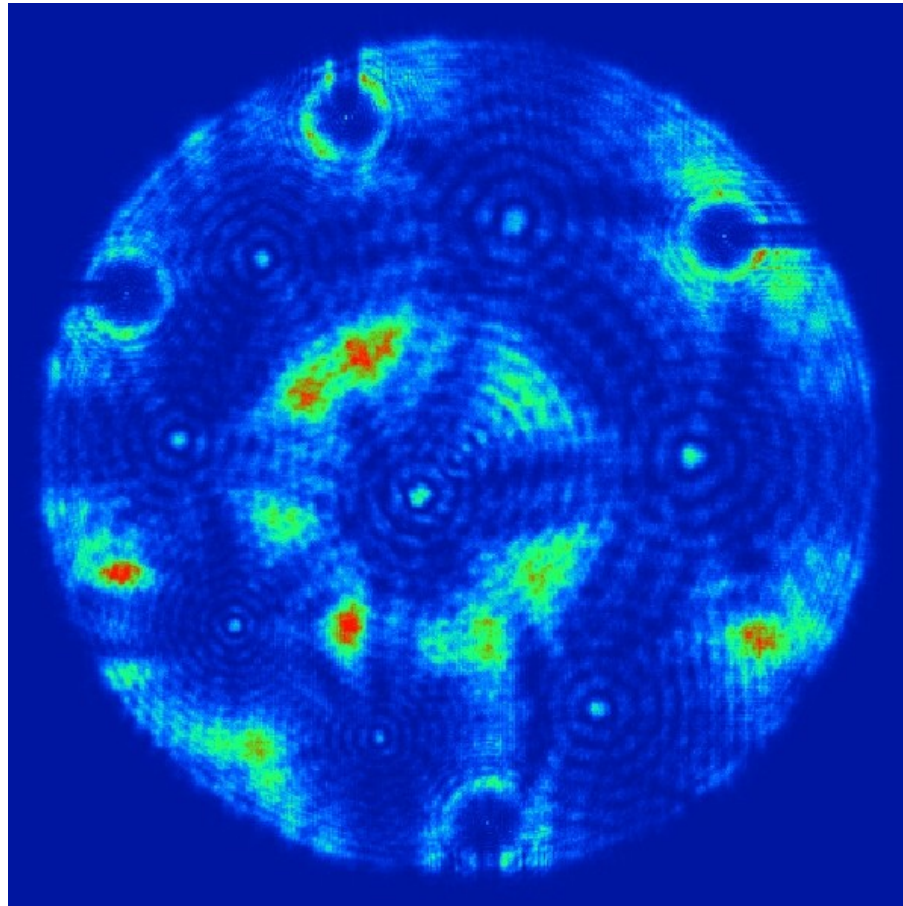
Further
development





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Layout simulation 15 cm diam. Simulated Poisson-Image for blue laser (405nm)



Stretched Wire
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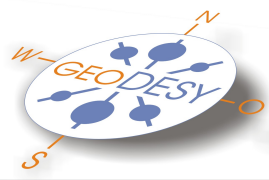
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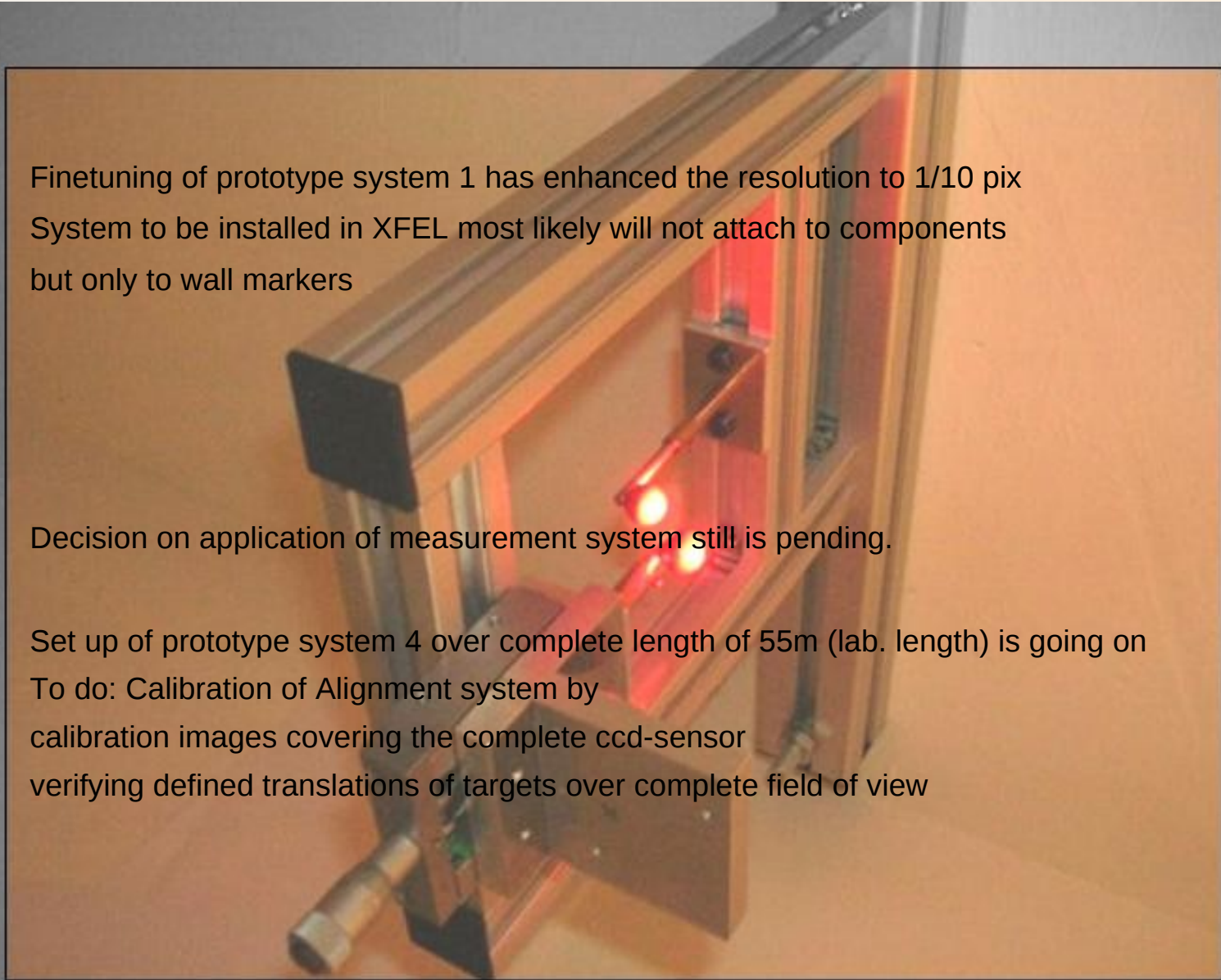
Tests of
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Further development
development

Finetuning of prototype system 1 has enhanced the resolution to 1/10 pix
System to be installed in XFEL most likely will not attach to components
but only to wall markers

Decision on application of measurement system still is pending.

Set up of prototype system 4 over complete length of 55m (lab. length) is going on
To do: Calibration of Alignment system by
calibration images covering the complete ccd-sensor
verifying defined translations of targets over complete field of view

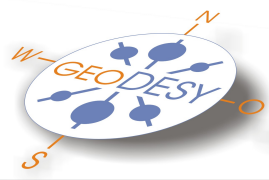


geo.desy.de

Thanks for your attention !



Johannes J. Prenting,
Deutsches Elektronen-Synchrotron
DESY, MEA2



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Stretched Wire
Installation

References:

Feier, I.; Friedsam, H.; Penicka, M. : The Poisson Alignment Reference System Implementation at the Advanced Photon Source. Proceedings of the Fifth International Workshop on Accelerator Alignment, Advanced Photon source, Argonne National Laboratory, Illinois, October 1997

Software
enhancements

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Casott N., Prenting J.J.: Genauigkeitssteigerung beim Korrelationsverfahren in der digitalen Bildverarbeitung Photogrammetrie, Fernerkundung, Geoinformation, Heft 2/1999, S. 101-112

SLRS
Prototype

Tests of
algorithm

Further
development