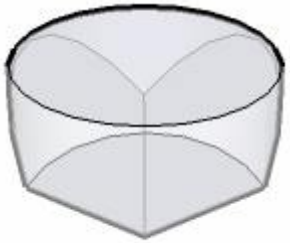
Keynote talk:
Retroreflector and Retroreflector Array



Also representing the activities of ILRS Signal Processing WG

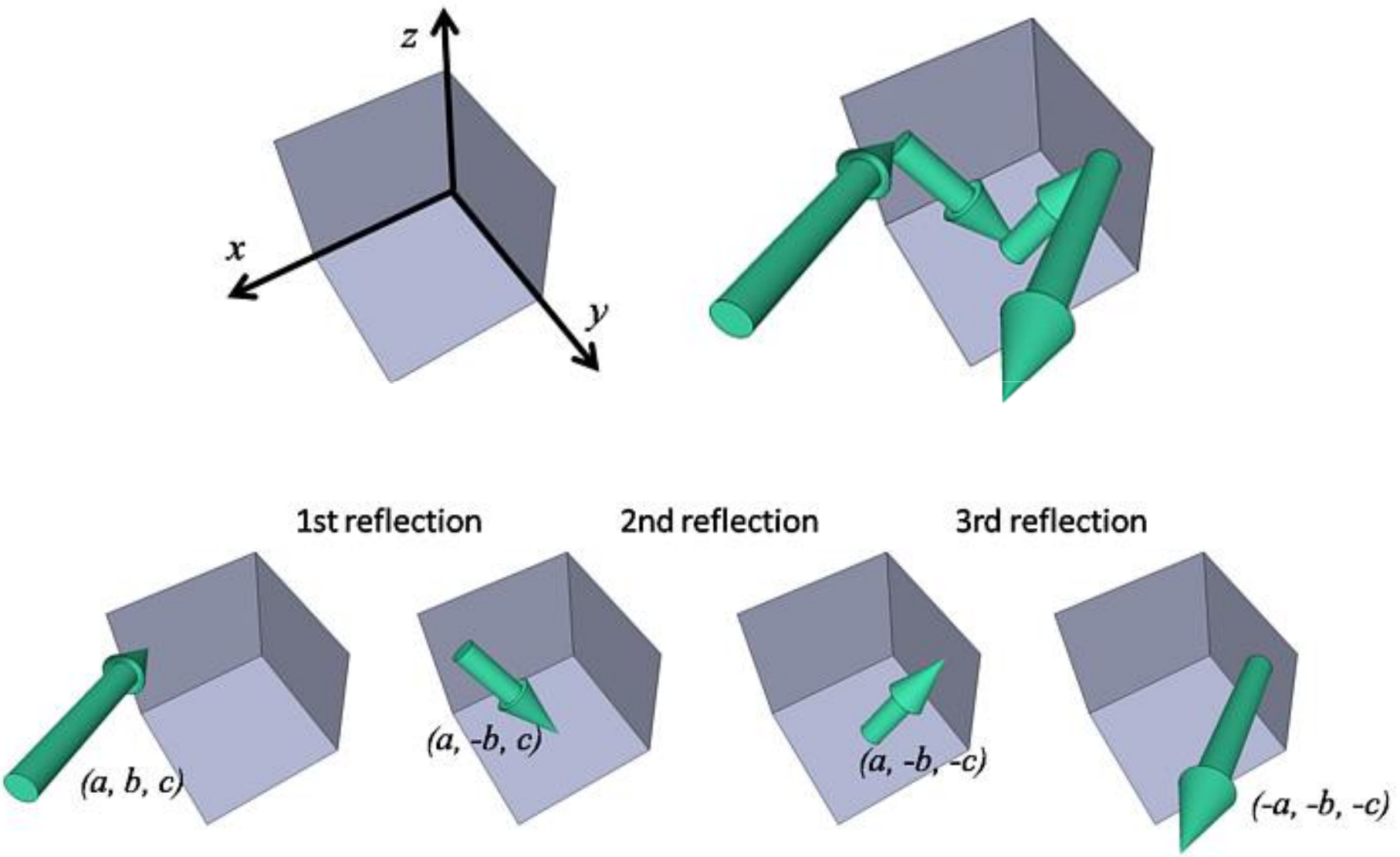
Toshimichi Otsubo (t.otsubo@r.hit-u.ac.jp),

Reinhart Neubert, and

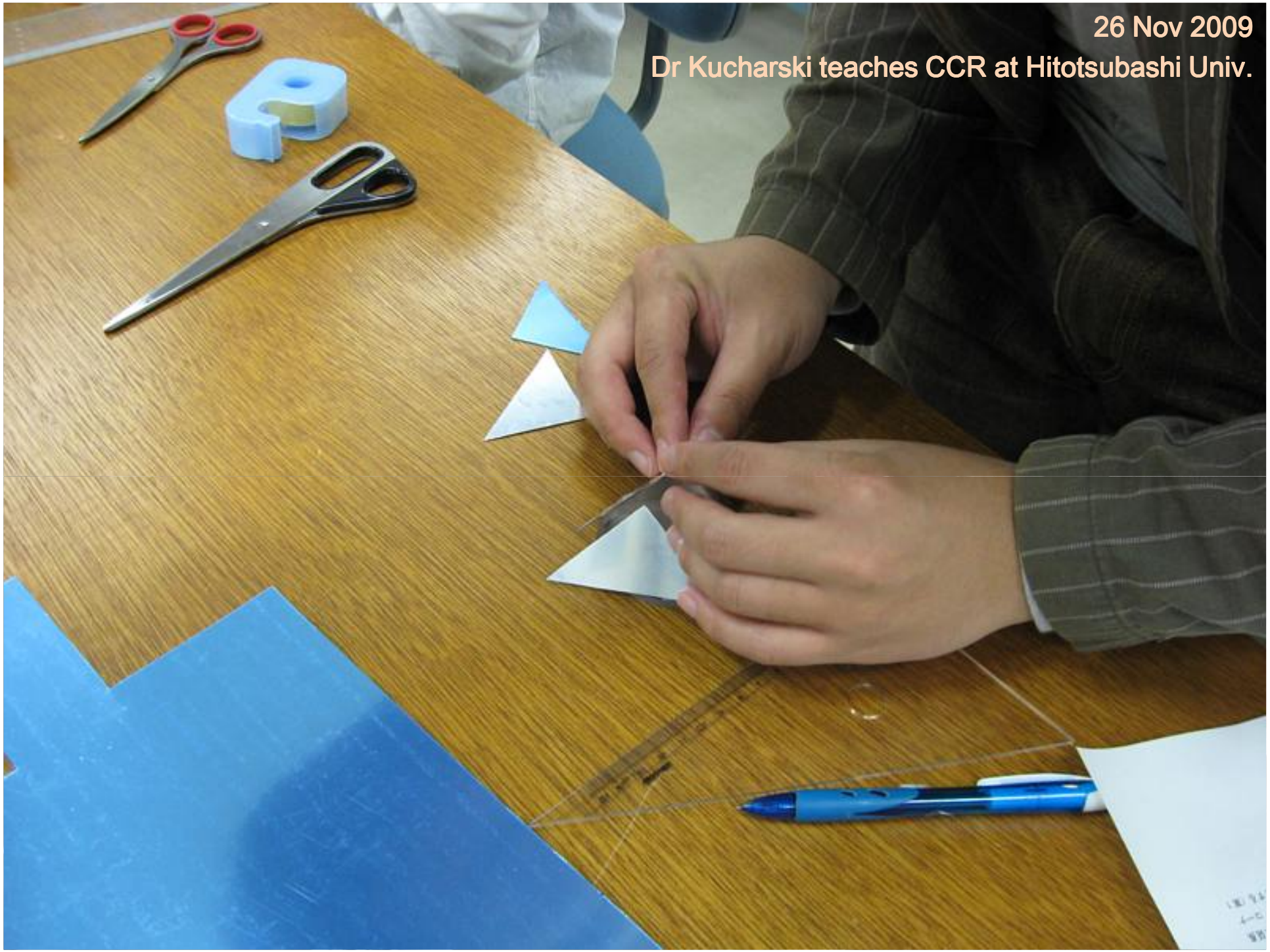
Scott Wetzel

17th International Workshop on Laser Ranging, 18 May, 2011.

How a corner cube works



http://geo.science.hit-u.ac.jp/education/minilec-ccr


26 Nov 2009
Dr Kucharski teaches CCR at Hitotsubashi Univ.

Take a photo!

[1] Edmund's (precision 5")

[2] DIY by Hitotsubashi Students (precision ~ a few deg)

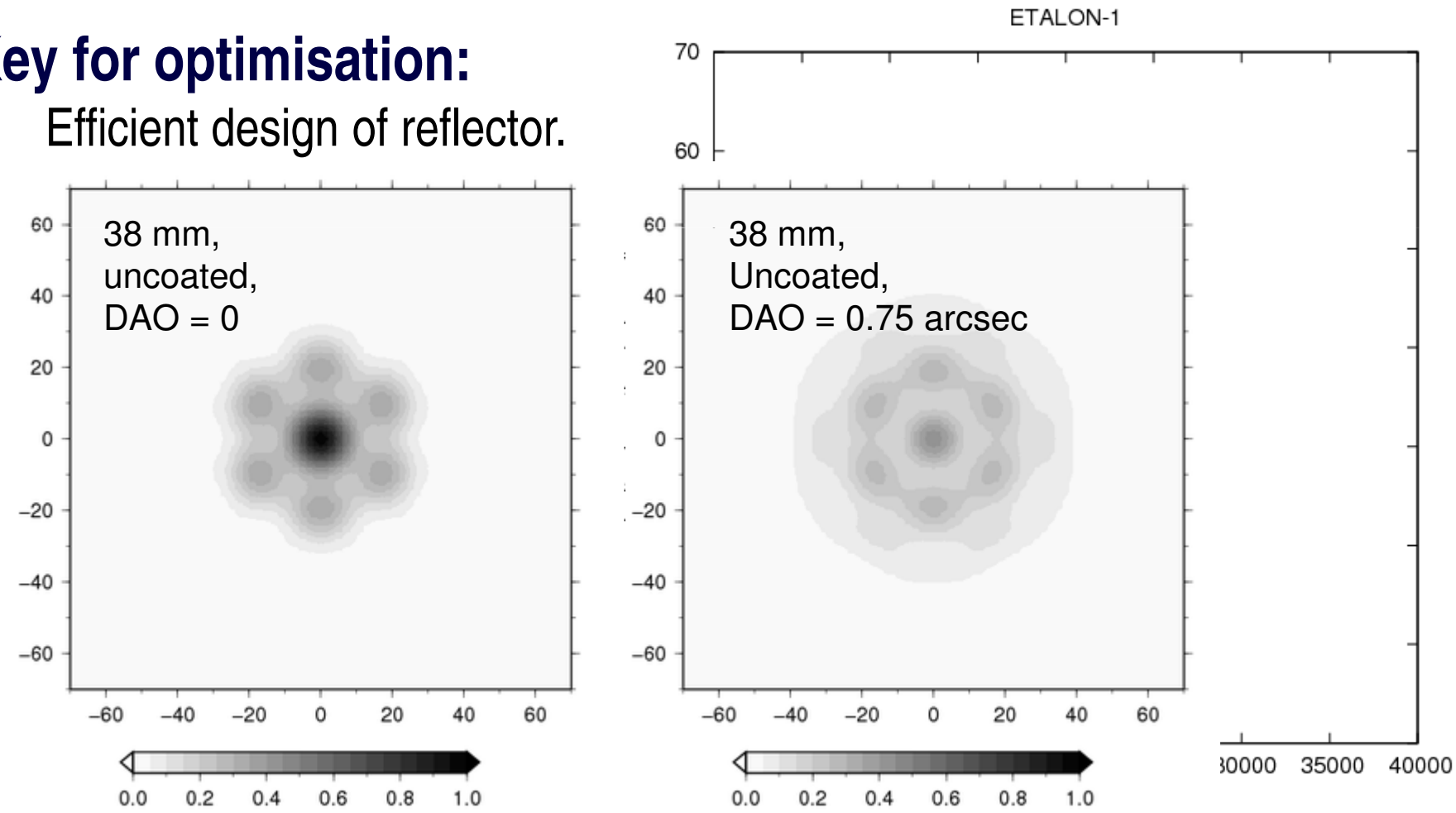
Velocity Aberration

Velocity variation range:

3.1 km/s (GEO) to 7.7 km/s (LEO)

Key for optimisation:

Efficient design of reflector.



Target signature

Historical dilemma

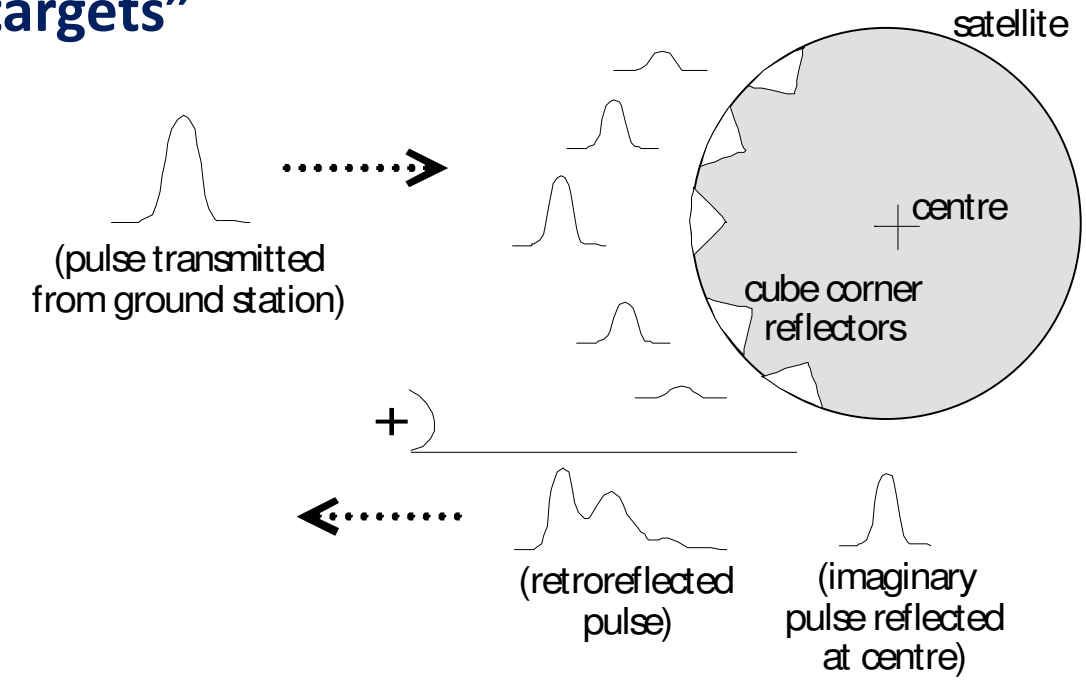
“More retro, less accurate”

4-5 cm for AJISAI, ETALON

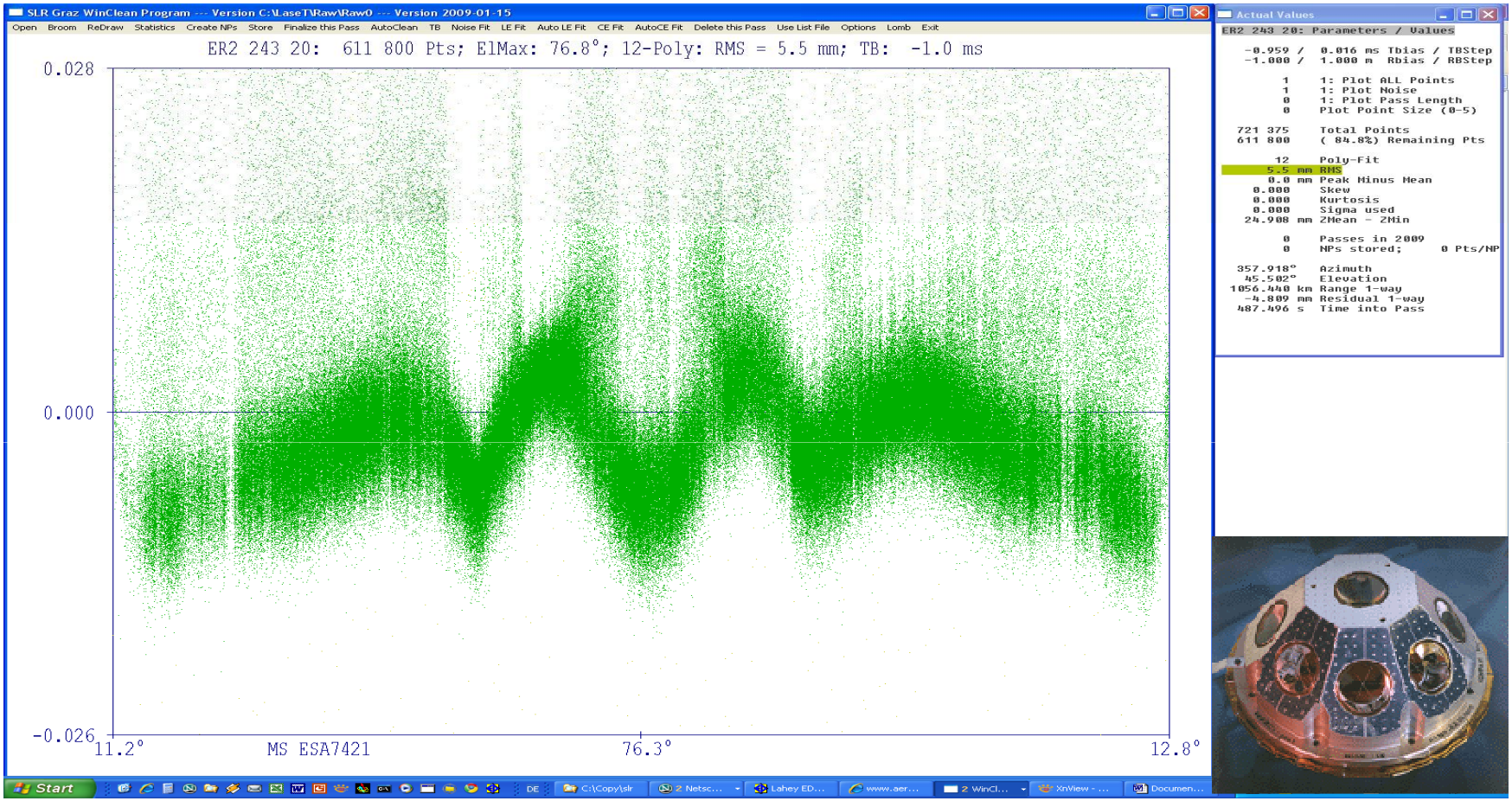
1 cm for LAGEOS

a few cm for GNSS, ~ 5 mm for LEO

→ “mm ranging to cm targets”



5-6 mm oscillation, due to ER2 Retro



Graz 2 kHz: ERS-2 Pass, high Elevation (76.8°); showing variations due to ranging to different retros;
Oscillations / variations are in the order of 5 mm

Kötzting, May 2011

→ orientation-dependent CoM correction?

Issues in this session

Key parameters (partly common to the prev session)

To Set: Aperture size & shape, Dihedral angle, Arrangement, Coated/Uncoated/Hollow, Wavelength, Polarisation, etc.

To See: Intensity, Angles of incidence (2D), Velocity aberration (2D; → FFDP), Target signatures, etc.

Next generation retroreflector

Getting closer to the best reflector or the best reflector array?

How to reduce the target signature effect

How to model/simulate the performance of a retroreflector

New Approach to the "mm ranging to cm target" problem

Zero Signature Target

Single corner cube (also seen in LLR Session)

BLITS-type ball lens

→ **"mm (or sub-mm?) ranging to zero-signature targets!"**

Reflector info is important!

Space Agencies and Reflector Developers:

Provide us with the detailed info on the retroreflectors and the CoM corrections

- To Missions WG and Signal Processing WG
- To be published in the ILRS Website
- Required even if the info is identical to others