Introduction to Session 8: New Reflector Designs

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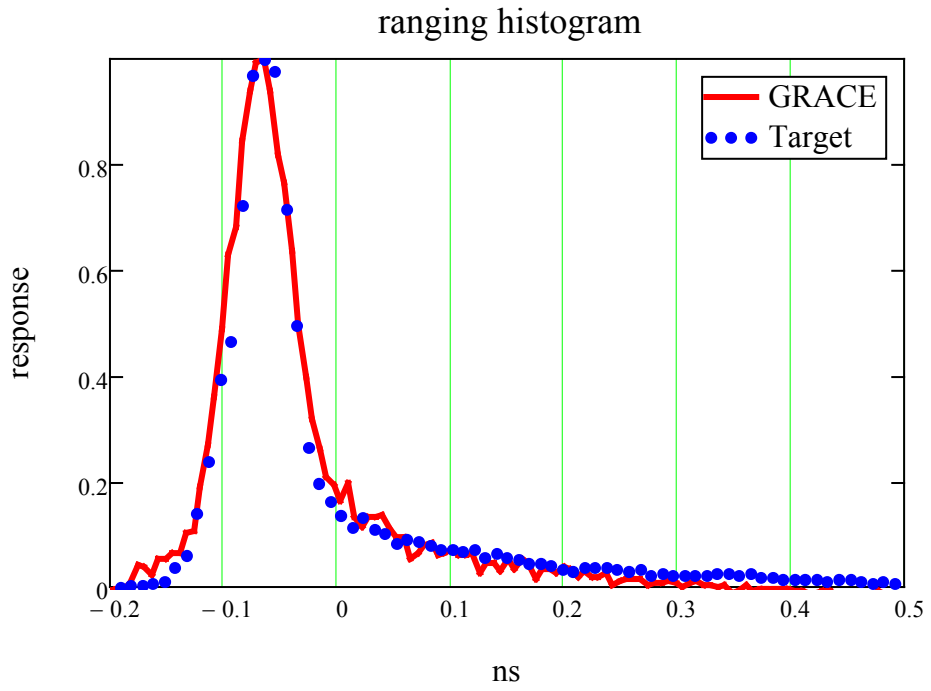
Main Design Goals:

- Zero Signature
- Efficient adaptation to aberration

Historical steps:

Kasser, Lund: 9th Workshop 1994, Omnidirectional open reflector proposal (8 reflectors)
CHAMP: 10th Workshop 1996, 4 prisms packed closely (launched 2000)
Vasiliev: 11th Workshop 1998, Luneberg-Lens proposal, satellite BLITS (launched 2009)
Currie: 10 cm Quartz prism for the Moon
Turyshev (JPL): 15 cm open reflector for the Moon
Neubert 2006, 2009: 20 cm Open reflector for GNSS proposal (omnidirectional)
Sokolov 2011: phase shifting dielectric coatings
Two-Spot for GNSS?

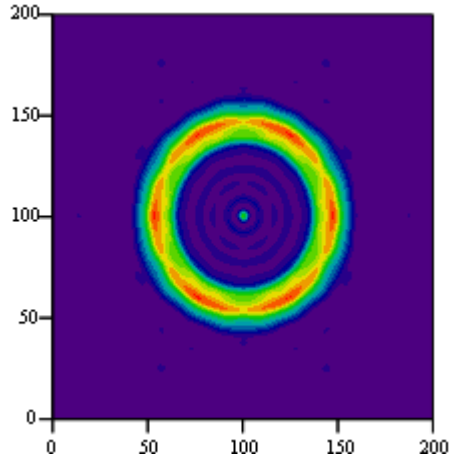
Comparing the residual histograms of GRACE with flat target (SPAD detector, Potsdam kHz-version)



The distribution of range residuals from GRACE is almost identical with The distribution of calibration (if a part of the GRACE pass is selected with single prism active)

FWHM = 65ps = 19.5 mm
RMS = 12ps = 3.6 mm

Matching an Open Reflector to Aberration



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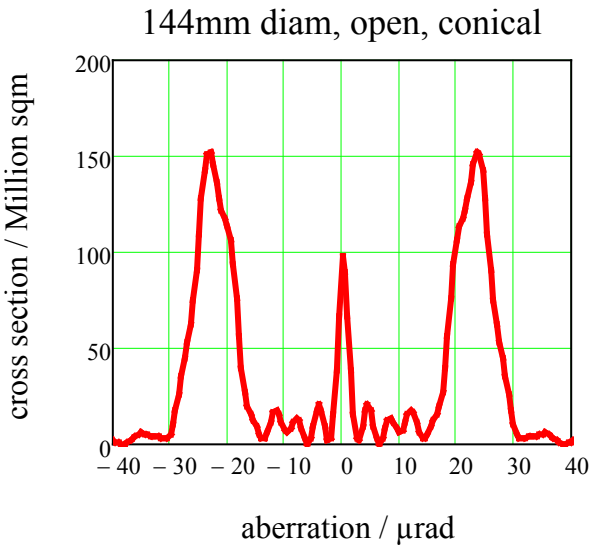
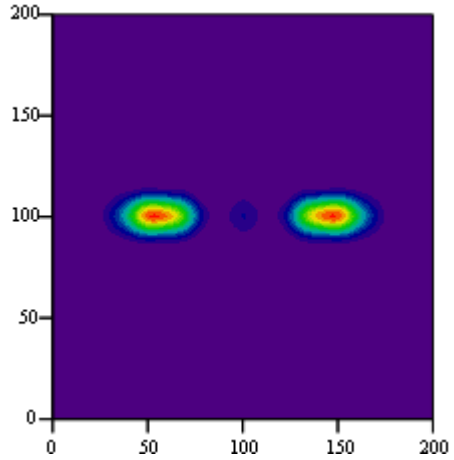


144 mm diam.

Ring shaped far field (curved mirrors)

Fully passive



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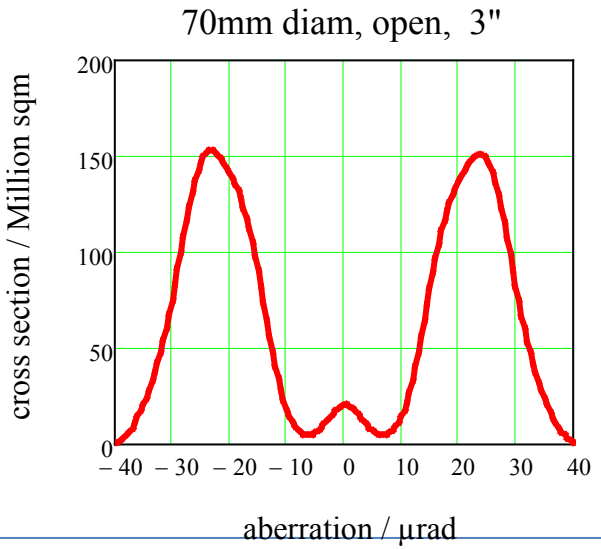
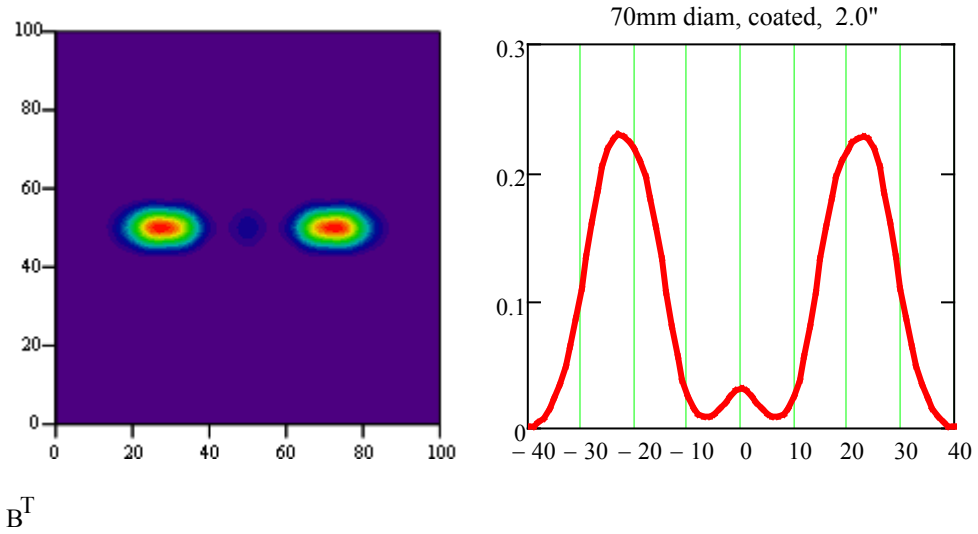


70 mm diam.

Two-spot far field (flat mirrors)

Automatic alignment device needed

7 cm diam. Two-Spot Solid Reflector



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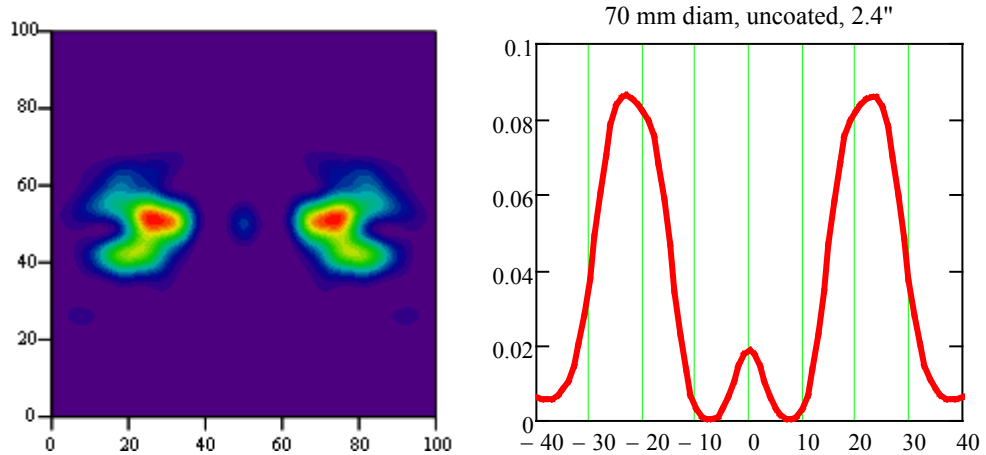
Coated prism
equivalent to open reflector
Max. 150 Mio sqm



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Uncoated prism
Max. 60 Mio sqm

Concluding Remark

- Zero signature reflectors for LEO satellites already in orbit (BLITS, GRACE, etc.)
- Design of single cube reflectors for HEO satellites and the Moon are under development
- Self aligning two-spot reflector for navigation satellites?