Reflection Grating Modules: Alignment and Testing

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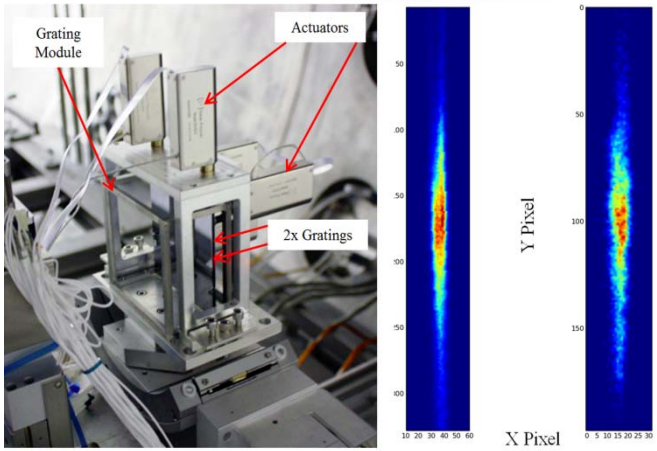
Objectives and Key Challenges:

- Implement an alignment methodology specific to off-plane reflection gratings
- Populate a module with aligned gratings capable of achieving spectral resolutions > 3000 (λ/δλ) with high throughput over the 0.2 – 2.0 keV band
- Advance the OP-XGS technology to TRL 5

Significance of Work:

- Enables high throughput, high spectral resolving power below 2 keV where the majority of X-ray spectral features reside.
- This will be the first time that multiple off-plane gratings have been aligned at this tolerance level with associated performance testing.



Left: Aligned gratings at PANTER. Right: SPO focus (left) vs. OP-XGS focus (right)

Approach:

- Quantify alignment tolerances
- Formulate alignment methodology
- Implement alignment methodology
- Performance and environmental test an aligned module
- Evaluate process and repeat in Year 2

Key Collaborators:

- Will Zhang – NASA/GSFC
- Jessica Gaskin – NASA/MSFC

Current Funded Period of Performance:

- Jan 1, 2015 – Dec 31, 2016

Recent Accomplishments:

- ✓ Quantified alignment tolerances for suborbital and Explorer spacecraft
- ✓ Alignment methodology and grating module have completed design phase and are entering implementation
- ✓ Aligned and tested two gratings with SPO telescope at PANTER

Next Milestones:

- Implement new alignment methodology (Q4 2015 – Q1 2016)
- Performance/environmental test aligned gratings at MSFC (Q2 2016)

Application:

- Large X-ray observatories
- Explorer class missions
- Suborbital rocket investigations

$TRL_{In} = 4$ $TRL_{PI\text{-}Asserted} = 4$ $TRL_{Target} = 5$