# Development of a high brilliance rotating anode dual-wavelength X-ray generator and multi-layer mirror for dual-wavelength

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# Why Dual-Wavelengths?

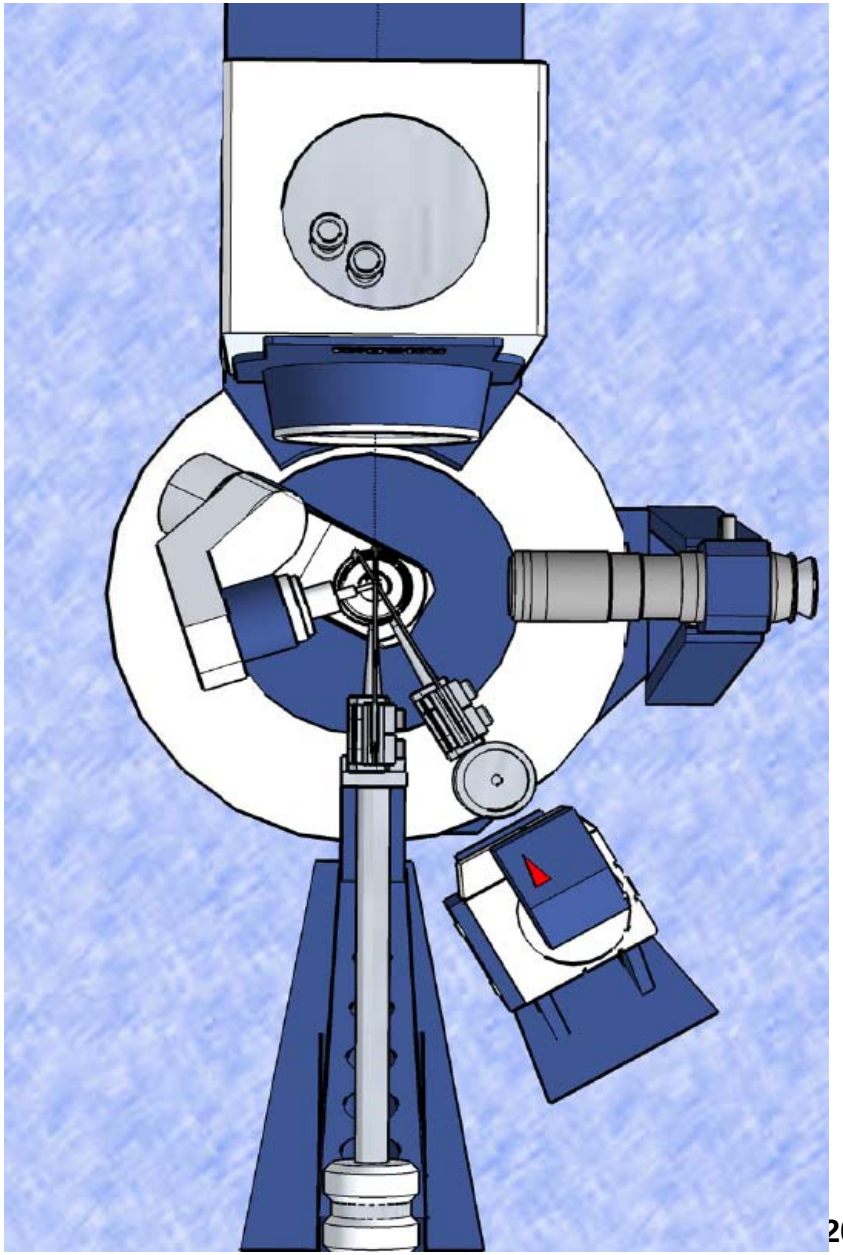
- Rh/W, Rh/Cr for XRF applications
- Cu/Cr for Powder XRD applications
- Cu/Mo for Radial distribution applications
- Cu/Cr for Macro molecule applications
- Cu/Mo for Small molecule applications

  Cu for organic, high intensity, Absolute configurations

  Mo for inorganic, heavy element containing crystals

# Conventional dual-wavelength system for Small Molecule Single Crystal

- Two sources
- Two sets of optics
- Two collimators
- Two sets of zero points for the goniometer
- Double-headed beam stop
- Cluttered access



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# comparison of the X-ray flux

| | Power (kW) | Optic | FWHM of beam | Relative Flux at 100 micron sample |
|---|---|---|---|---|
| **Cu Source** | | | | |
| Sealed tube | 2.2 | Graphite | 500 | 1 |
| MicroMax-002+ | 0.04 | CMF | 160 | 33 |
| MicroMax-003 | 0.03 | CMF | 100 | 51 |
| MicroMax-007-HF (RAG*1) | 1.2 | VM-HR | 300 | 105 |
| MicroMax-007-HF (RAG) | 1.2 | VM-HF | 210 | 246 |
| **Mo Source** | | | | |
| Sealed tube | 2.4 | Graphite | 500 | 1 |
| MicroMax-003 | 0.03 | CMF | 120 | 9 |
| MicroMax-007-HF (RAG) | 1.2 | VM | 92 | 55 |

# MM007 DW VariMax DW & RAPID IP Diffractometer

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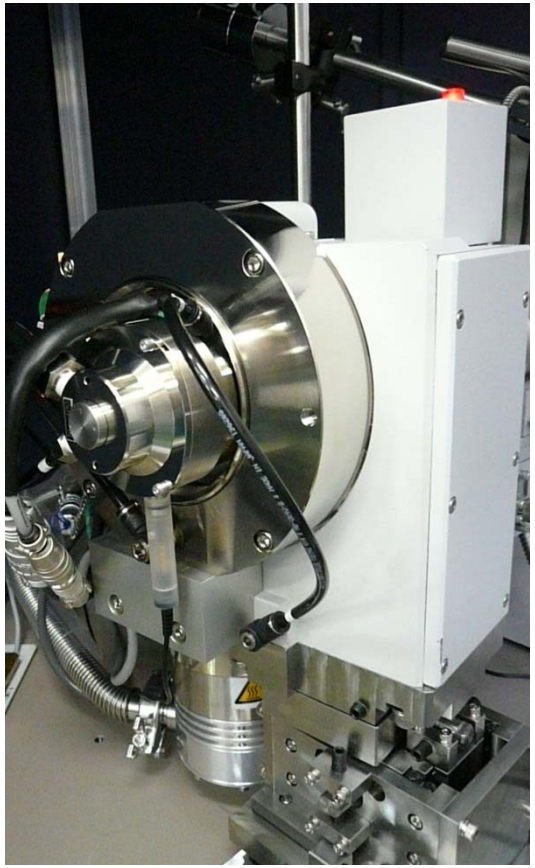
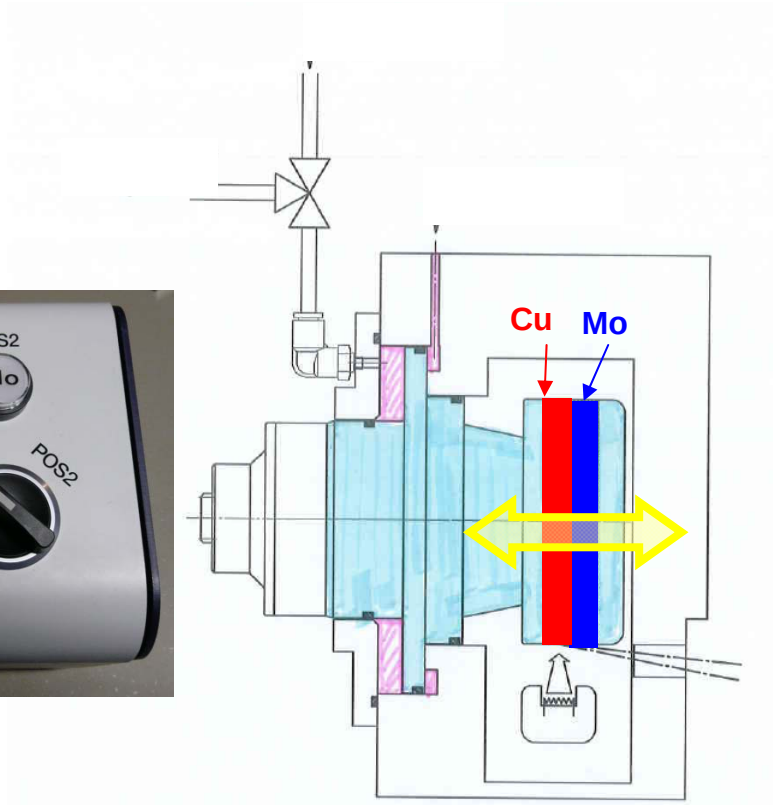
# Dual-wavelength target!

## No need to change target – just flip a switch

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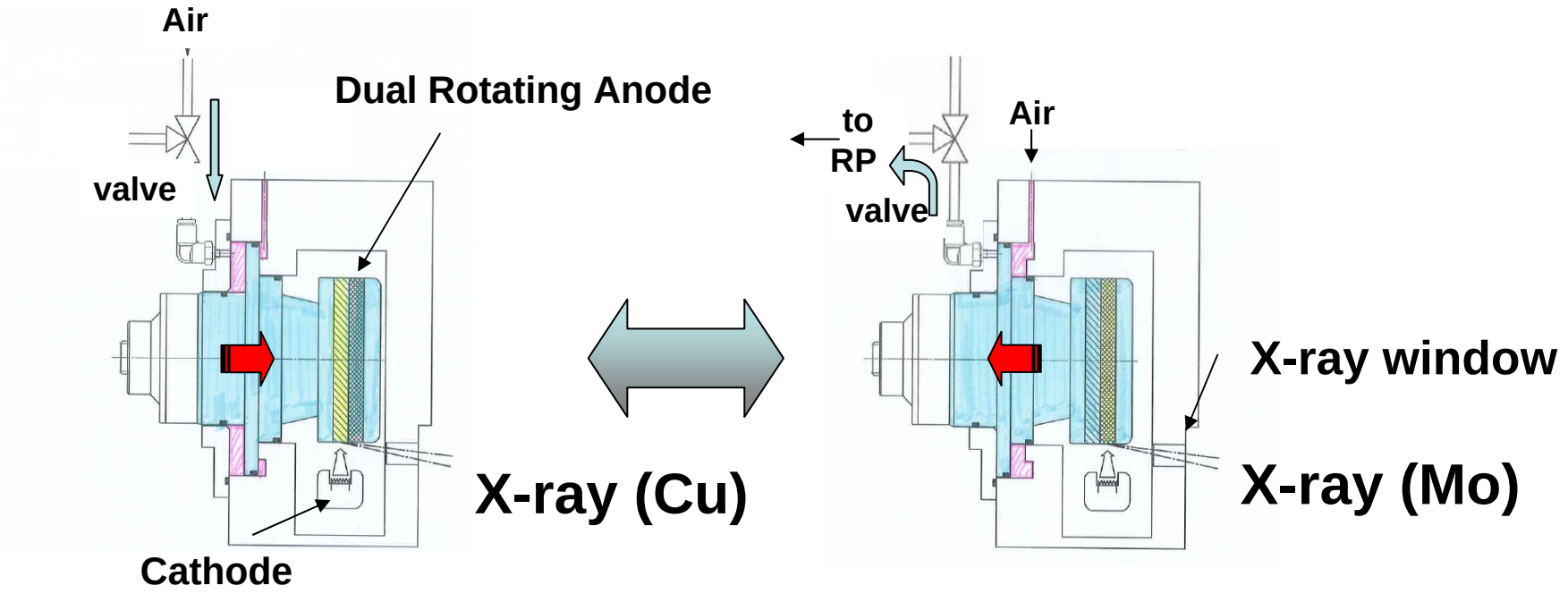
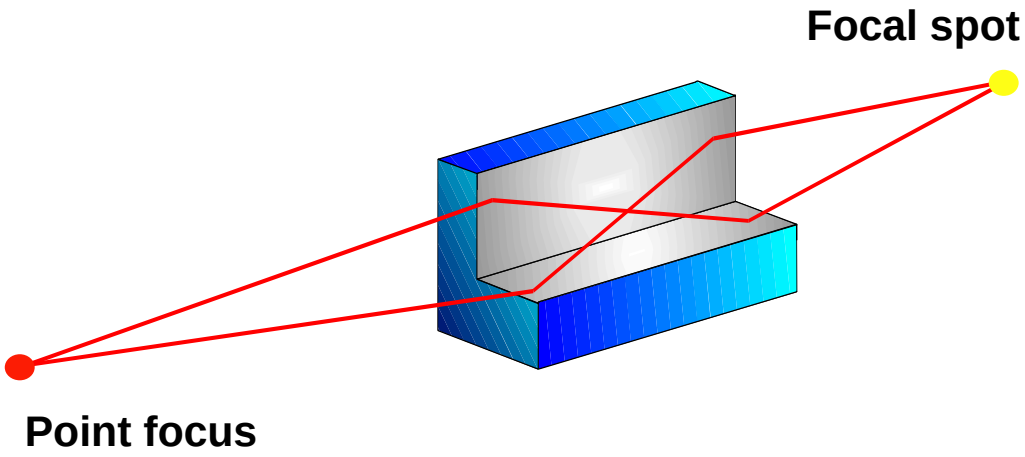
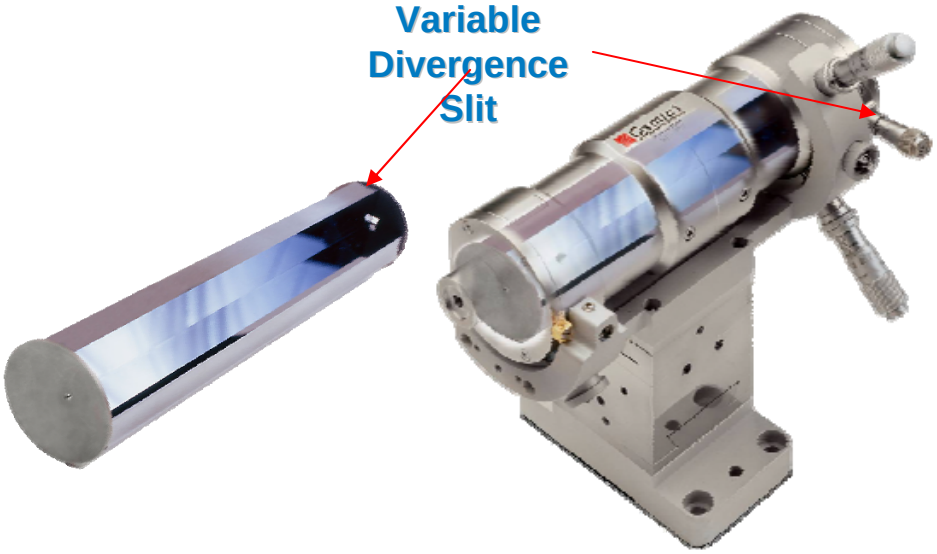



Schematic of Sliding mechanism of X-ray target

# Optics: CMF optics side-by-side scheme




# Optics: VariMax optics Adjustable divergence angle

# Optics: Dual optics in a single housing

- The VariMax™ DW Optic with ArcSec™ Technology: Two VariMax optics are housed in a single assembly.
- Either optic can be selected by a simple rotation.
- The patented adjustable divergence feature is maintained for each optic.


VariMax™ DW
with
ARCSEC™
Technology
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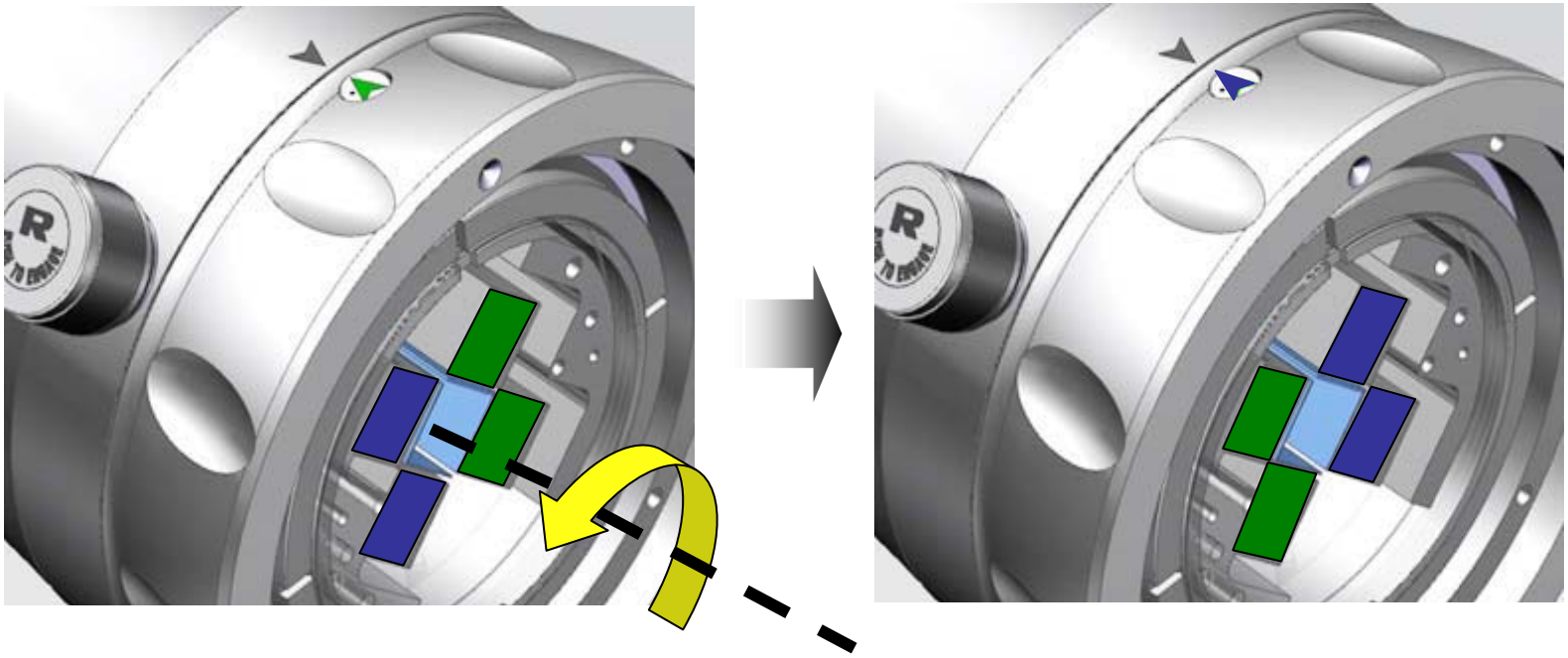
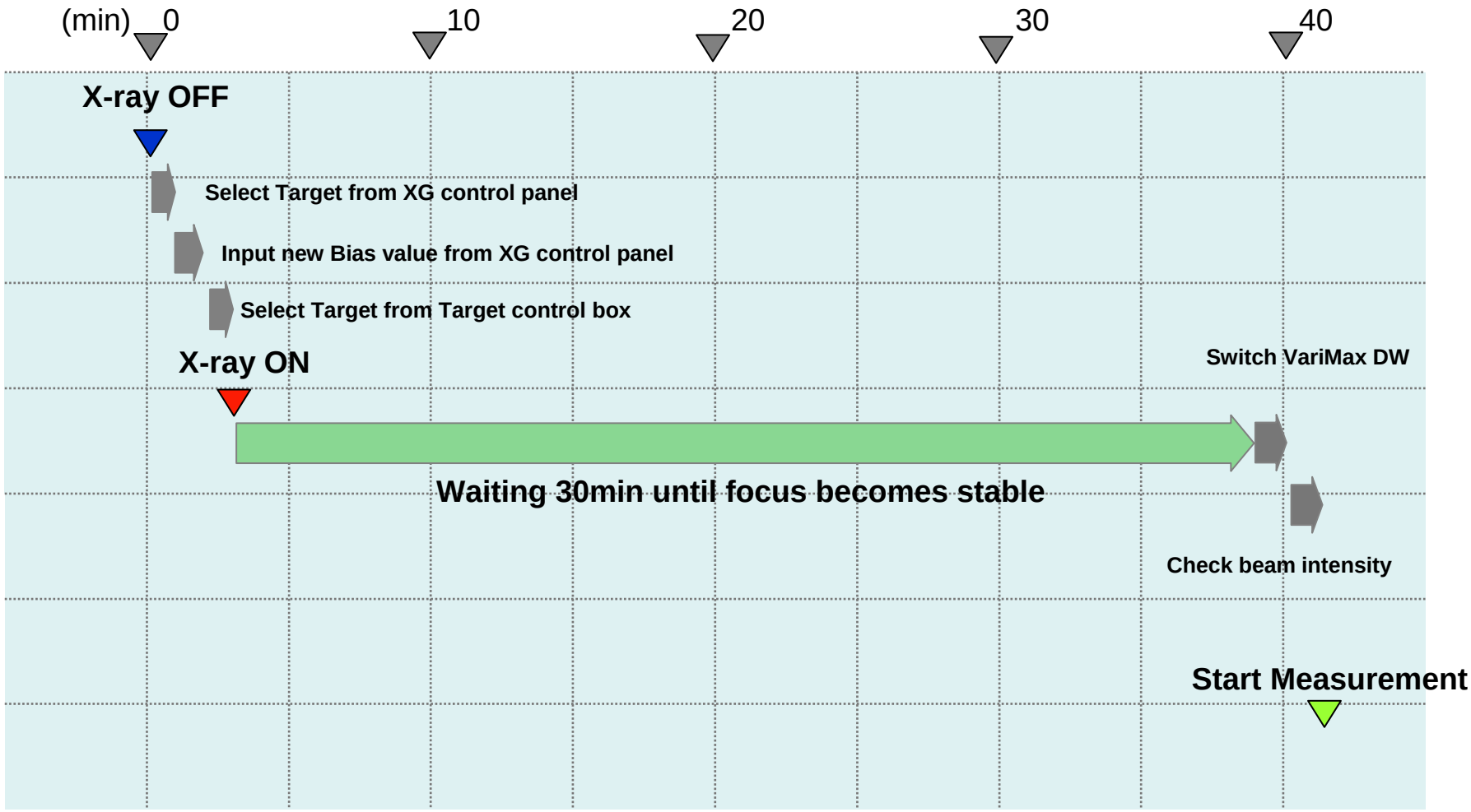
# Rotation mechanism for selection of optics



**Green blocks are Varimax-Cu, Blue blocks are Varimax-Mo**




# Switching Wavelength Time Chart

# Realignment and adjustment

We can confirmed

- Repeatedly that the direct beam passes through a 50 micrometer diameter double pin hole collimator
- Without any realignment and adjustment for VariMax and optics.
- In general, realignment and adjustment are not required when using a standard 300 micron in diameter collimator.

# Conclusion:

Our successful development has provided

- A fast and easy means of switching wavelength.
- The sliding mechanism changing the anode target has no adverse influence on providing high brilliance X-rays stably.
- The VariMax DW works very well for switching
- the VariMax optic without any compromises.

# Thank You, Takk.

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