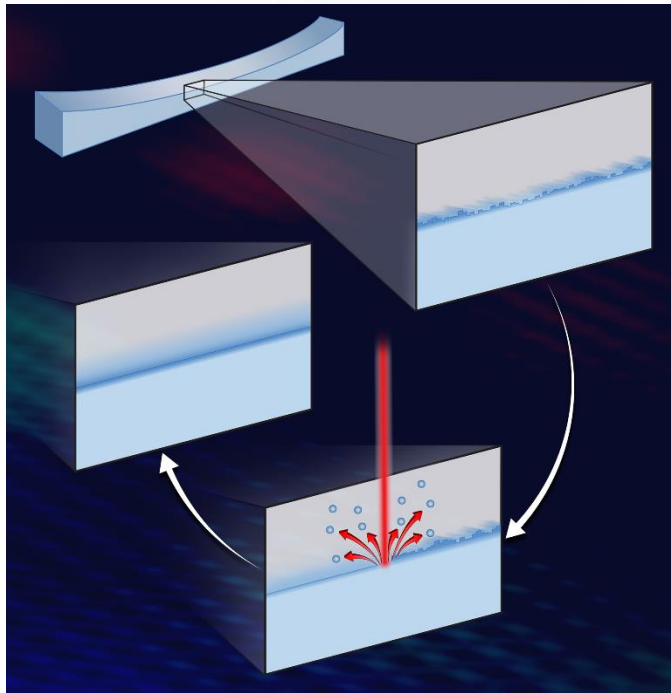


# Elevating X-Ray Optics to the Next Level



*The illustration shows how a used x-ray mirror can be repolished using an ion beam. After this treatment, the newly polished mirror has an enhanced performance up to the diffraction limit.*

T. Wang, L. Huang, H. Choi, M. Vescovi, D. Kuhne, Y. Zhu, W. C. Pullen, X. Ke, D. Wook Kim, Q. Kemao, K. Tayabaly, N. Bouet, M. Idir. *Optics Express* 29, 10, 15114-15132 (2021)

*Work was performed in part at Brookhaven National Laboratory*

## Scientific Achievement

Scientists demonstrated a method to perform sub-nanometer level x-ray mirror fabrication by coupling state-of-the-art optical metrology and ion-beam figuring (IBF) to polish x-ray mirrors for performance at the diffraction limit.

## Significance and Impact

Advances in materials science strongly depend on the brightness of synchrotron light sources & more light sources can create extraordinarily bright light beams; however, there is a very limited supply of mirrors that can deliver these beams to the experiments. This study opens a new pathway to polishing x-ray optics to reach this ultimate performance.

## Research Details

- Developed the Robust Iterative Surface Extension (RISE) method that resolves existing problems with modeling precision for x-ray mirror.
- Demonstrated that the calculated precision can be achieved using ion-beam figuring .