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Silicon pore optics for high-energy optical systems

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Stellingen

Behorend bij het proefschrift "Silicon pore optics for high-energy optical systems".

- I. Optimizing optical performance without considering mechanical robustness is to no purpose when designing a space-borne telescope.
Chapter 2 of this thesis.
- II. It would be unavailing to fly the focusing optics of high-energy telescopes such as Athena without thin film metallic coatings.
Chapter 2 and 3 of this thesis.
- III. As the use of magnetic resonance imaging increases, tumors will be detected at earlier stages, making Laue lenses well-suited tools to treat them.
Chapter 4 of this thesis.
- IV. Satellite formation flying will eventually open a new era for space-borne gamma-ray telescopes.
Chapter 4 of this thesis.
- V. Building upon the conclusions of Vacanti, understanding statistical errors of the encircled energy fraction and its quantiles, notably the half-energy width, is critical to reducing the characterization time of the individual imaging elements of large segmented missions like Athena.
G. Vacanti, Applied Optics 54, 10619-10622 (2015).
- VI. The conclusion of Massahi et al. that atmospheric contamination can deteriorate thin films is correct, but organic contamination of silicon pore optics surfaces could lead to better optical performance.
S. Massahi et al., Applied Optics 59, 10902-10911 (2020).
- VII. The surprisingly high dose rate presented by Paternò et al. is due to an erroneous treatment of diffraction in crystals when the source is placed at finite distance.
G. Paternò et al., Journal of Applied Crystallography 49, 468 (2016).
- VIII. Curved crystals allowing the concentration of radiation in both radial and azimuthal directions would lead to much better focusing properties than the individual single crystals presented by Wade et al.
C. Wade et al., Nuclear Instruments and Methods in Physics Research Section A 895, 135 (2018).
- IX. Pursuing a PhD while working in a company is a Buridan's ass dilemma.

David Girou
Leiden, June 14, 2022