高い角度分解能を実現する新しい大面積宇宙 X 線望遠鏡の概念設計

A new concept of a High-Angular-Resolution X-ray Optics with a Large-area X-ray Telescope for an astronomical use

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It is presented a concept of a high-throughput telescope system with a high angular resolution for an astronomical use. In the concept, a light-weighted focusing telescope with a high throughput (large effective area) is used as a microcosm of the illuminated position of the telescope. The two-dimensional detector (i.e., imager) must be positioned not at its best focus, but at a slight defocus position. In addition, multi-grid coded-mask (or modulation collimator) is installed on the front of the telescope. The multi-grid coded-mask works as coded aperture camera like as a high angular resolution booster of the focusing telescope. Since we can use a small-size detector such as the X-ray CCD at the defocused position, the telescope system gives an opportunity to make a high-resolution spectroscopy with a high-angular-resolution and with a large effective area.

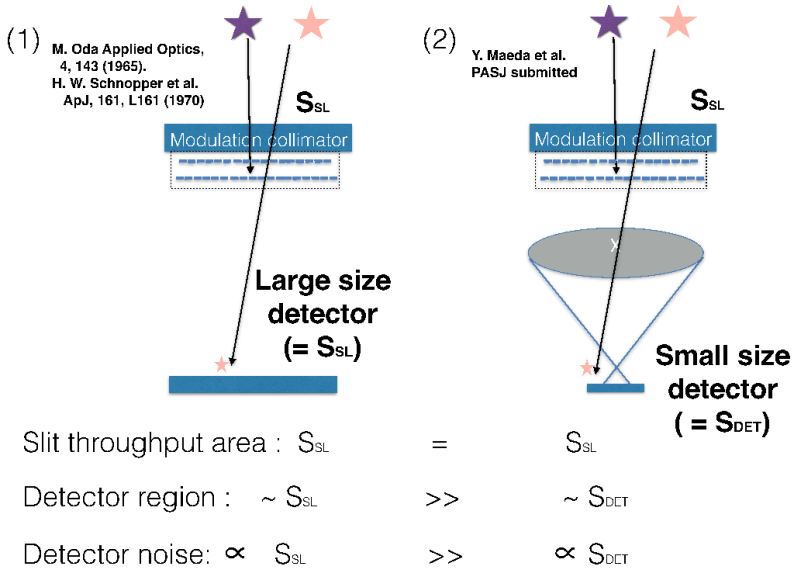

図 1: (1) A conventional modulation collimator with the double slits. (2) A focusing telescope system with an angular resolution booster (modulation collimator).

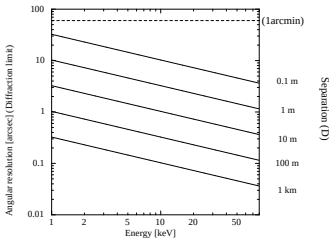

図 2: Diffraction limit for the angular resolution of an angular resolution booster (slit-mask unit). The solid lines correspond to the limit for a given distance. The dashed line corresponds to an angular resolution of a conventional light-weight telescope of 1 arcmin.