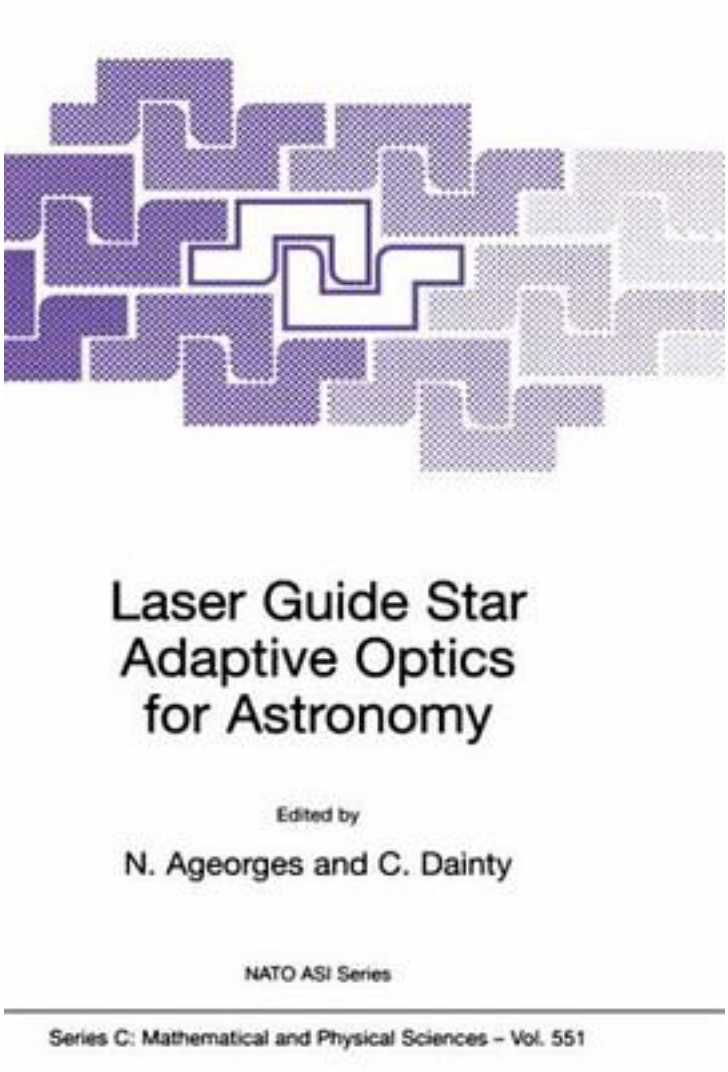
Laser Guide Star Adaptive Optics for Astronomy



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Adaptive optics allows the theoretical limit of angular resolution to be achieved from a large telescope, despite the presence of turbulence. Thus an eight meter class telescope, such as one of the four in the Very Large Telescope operated by ESO in Chile, will in future be routinely capable of an angular resolution of almost 0.01 arcsec, compared tot he present resolution of about 0.5 arcsec for conventional imaging in good condition. All the world's major telescopes either have adaptive optics or are in the process of building AO systems. It turns out that a reasonable fraction of the sky can be observed using adaptive optics, with moderately good imaging quality, provided imaging in done in the near IR. To move out of the near IR, with its relatively poor angular resolution, astronomers need a laser guide star. There is a layer of Na atoms at approximately 90 km altitude that can be excited by a laser to produce such a source, or Rayleigh scattering can be employed lower in the atmosphere. But the production and use of laser guide stars is not trivial, and the key issues determining their successful implementation are discussed here, including the physics of the Na atom, the cone effect, tilt determination, sky coverage, and numerous potential astronomical applications.

作者介绍:

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