Presentation: OP10O-OP322-12 Focusing x-ray telescopes
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Abstract Text for Online or Printed Programs:
During the half-century history of x-ray astronomy, focusing x-ray telescopes---through increased effective area and finer angular resolution---have improved sensitivity by 8 orders of magnitude. Here, we review previous and current x-ray-telescope missions. Next, we describe the planned next-generation x-ray-astronomy facility---the International X-ray Observatory (IXO). We conclude with an overview of a concept for the next next-generation facility---Generation X. Its scientific objectives will require very large areas (about 10000 m^2) of highly-nested, lightweight grazing-incidence mirrors, with exceptional (about 0.1-arcsec) resolution. Achieving this angular resolution with lightweight mirrors will likely require on-orbit adjustment of alignment and figure.

Abstract Text for Technical Review Purposes:
High-energy astrophysics is a relatively young scientific field, made possible by space-borne telescopes. During the half-century history of x-ray astronomy, focusing x-ray telescopes---through increased effective area and finer angular resolution---have improved sensitivity by a factor of a 100 million. This technological advance has enabled numerous exciting discoveries and increasingly detailed study of the high-energy universe---including accreting (stellar-mass and super-massive) black holes, accreting and isolated neutron stars, pulsar-wind nebulae, shocked plasma in supernova remnants, hot thermal plasma in clusters of galaxies. As the largest structures in the universe, galaxy clusters constitute a unique laboratory for measuring the gravitational effects of dark matter and of dark energy. Here, we review the history of x-ray astronomy---especially, the major x-ray-telescope missions---and highlight some of the scientific results enabled by these telescopes. Next, we describe the planned next-generation x-ray-astronomy facility---the International X-ray Observatory (IXO). We conclude with an overview of a concept for the next next-generation facility---Generation X. The scientific objectives of such a mission will require very large areas (about 10000 m^2) of highly-nested lightweight grazing-incidence mirrors with exceptional (about 0.1-arcsec) angular resolution. Achieving this angular resolution with lightweight mirrors will likely require on-orbit adjustment of alignment and figure.