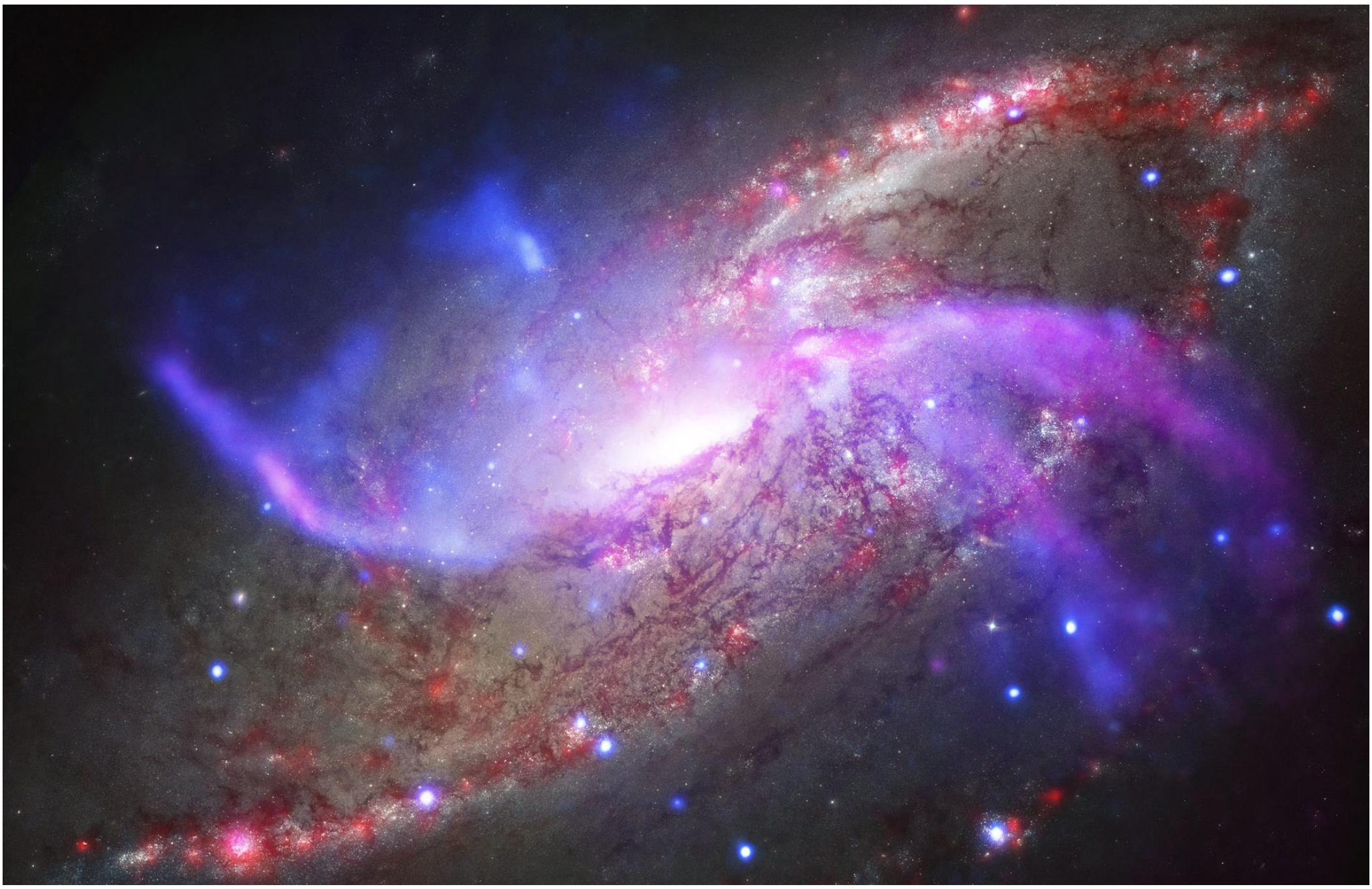
The 2nd Fred Lo Lecture



The Impact of Masers in Modern Astrophysics

James Moran (Harvard-Smithsonian Center for Astrophysics)

Brief CV

16:30-17:30pm,
Tuesday,
11 September 2018

Lecture Hall,
3rd floor, SHAO

Prof. Moran is the Donald H. Menzel Professor of Astrophysics at Harvard University and a Senior Radio Astronomer at the Smithsonian Astrophysical Observatory (CfA), where he has spent his entire career. He previously served as Chair of the Harvard Department of Astronomy and Associate Director of SAO. Moran did his undergraduate work at the University of Notre Dame and received his PhD from MIT in 1968. He received the AAS Newton Lacy Pierce Prize, was the joint recipient of the 1971 Rumford Medal of the American Academy of Arts and Science, and was the 1996 NRAO Jansky Lecturer. He is a member of the U.S. National Academy of Sciences and the American Academy of Arts and Sciences. He is a coauthor of a widely used reference book, Interferometry and Synthesis in Radio Astronomy, which is being revised for a third edition.

ABSTRACT

I will describe the discovery of cosmic masers in 1965 and their subsequent use as probes of astrophysical phenomena. I will concentrate on two topics: the measurement of magnetic field strength in regions of star formation and the measurements of the masses and distances to black holes in the centers of active galaxies through the Keplerian motions of their associated water vapor masers. The archetypical maser of this type is associated with the galaxy NGC4258. It was discovered in 1984 by Fred Lo and his collaborators at the Owens Valley Radio Observatory. Their work transformed the paradigm for extragalactic maser emission. I will describe how precise measurements of the masers in this galaxy have led to very accurate determinations of the mass of the associated black hole ($3.9 +/- 0.1 \times 10^7$ solar masses) and its distance (7.5 +/- 0.2 Mpc). The masers in NGC4258 have been detected on baselines of up to 26 Earth diameters (a resolution of 8 microarcseconds) with the RadioAstron mission. I will also discuss the impact of maser distance measurements on the determination of Ho, a topic of particular interest to Lo.