Hubble Space Telescope

Cycle 16 AR Proposal

The Near and Far Sides of M87

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Scientific Category: AGN/QUASARS

Scientific Keywords: AGN PHYSICS, BLACK HOLES, JETS

Total Budget Amount: $78,001 (6 month data analyst; 3 month postdoc.)

Abstract

We propose to assemble the deepest ever image of the M87 jet and its environs using archival data acquired for unrelated purposes. By studying the AGN, the jet and ISM physics we address the role and nature of AGN feedback to the ISM and the quantitative physical nature of the jet and AGN. With over 50 orbits of ACS/WFC F606W and F814W imaging we can detect or place significant upper limits on the brightness of a counter-jet, yielding insight into the jet beaming factor and orientation to the line of sight. With this deepest ever jet image, we will also probe the extent to which optical emission can be traced both from the primary jet into the radio lobe and the SE synchrotron hotspot at the termination of the counter-jet, to quantify optical synchrotron loss processes and map spectral ageing. We will seek scattered light from ambient hot electrons known to be present in the nuclear regions of M87 and hence identify the allowed parameter space involving nuclear luminosity, nuclear beam pattern and ISM density. Electron scattering in particular is symmetric with respect to direction and hence we have the best chance to detect a scattering beam in the counter-jet direction. Faint dust features and emission-line filaments will also be mapped and compared to the radio source morphology to better understand their interaction and provide information on the energetic interplay between radio sources, jets and the ISM.

Investigators:

	Investigator	Institution	Country
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Number of investigators: 7

* ESA investigators: 1

Dataset Summary:

Instrument	No. of Datasets	Retrieval Method	Retrieval Plan
ACS	124	FTP	Standard STScI procedures