

Dynamics of Clumpy Supersonic Flows in Stellar Jets and in the Laboratory

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Scientific Category: ISM AND CIRCUMSTELLAR MATTER

Scientific Keywords: JETS, HERBIG-HARO OBJECTS, DYNAMICS, YOUNG STARS AND
PROTOSTELLAR OBJECTS

Instruments: WFPC2

Proprietary Period: 12

Orbit Request	Prime	Parallel
Cycle 16	16	0

Abstract

We propose to reobserve three stellar jets in order to quantify how rapidly clumps in these flows accelerate and decelerate, and to compare the results with ongoing numerical simulations and laboratory experiments. Each jet has been imaged twice before with HST, and precise proper motions have been measured for all emitting knots in the jets. Images from the first two epochs show clear differential motions between adjacent clumps, as well as shear, and possibly fragmentation. The proposed third epoch will enable us to measure the first ever accelerations in jets, quantify errors in existing proper motion measurements, and observe in real time how fluid instabilities develop in supersonic flows. The new images will make it possible to compare the behavior of astrophysical flows directly with numerical simulations and with laboratory experiments of bow shocks and clumpy flows in progress at the Omega laser facility.

Investigators:

	Investigator	Institution	Country
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CoI	Dr. Brent Blue	Lawrence Livermore National Laboratory	USA/CA
CoI	Mr. Jacob Palmer	Rice University	USA/TX

Number of investigators: 9

* ESA investigators: 3

Target Summary:

Target	RA	Dec	Magnitude
HH-34	05 35 31.5000	-06 27 58.00	
HH-47	08 25 52.5000	-51 00 0.00	
HH-1	05 36 23.8000	-06 46 20.00	

Observing Summary:

Target	Config Mode and Spectral Elements	Flags	Orbits
HH-34	WFPC2 Imaging F673N		4
HH-34	WFPC2 Imaging F656N		4
HH-47	WFPC2 Imaging F673N		3
HH-47	WFPC2 Imaging F656N		3
HH-1	WFPC2 Imaging F673N		1
HH-1	WFPC2 Imaging F656N		1

Total prime orbits: 16