Smoke Point in Coflow Experiment (SPICE)

PI: Dr. David Urban, NASA GRC
Co-I: Prof. Peter Sunderland, U. Maryland
PS: Dr. Zeng-guang Yuan, NCSER
PM: Robert Hawersaat, NASA, GRC
Engineering Team: ZIN Technologies, Inc.

Glenn Research Center

Objective:

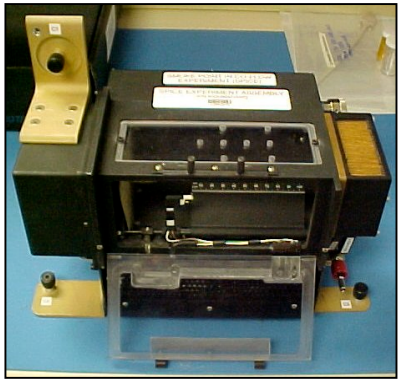
- Improved understanding of soot emission from jet flames.
- Measure smoke-point properties of jet diffusion flames in a co-flow environment as a function of nozzle diameter, co-flow velocity, fuel velocity and fuel composition.

Relevance/Impact:

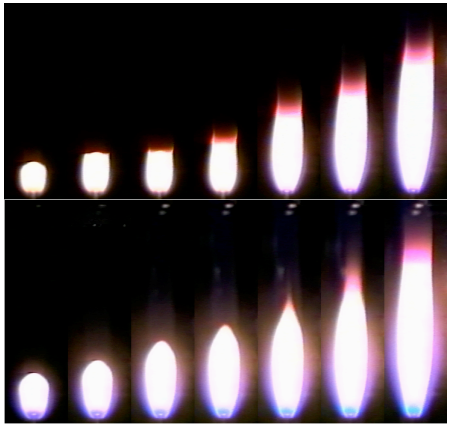
- Improved design of future space experiments using validated flame shape models and smoke height predictions.
- Support for the laminar flamelet hypothesis validation by the LSP experiment.
- Improved understanding of and ability to predict heat release, soot production and emission in microgravity fires.

Development Approach:

- Flight hardware is based on the design of the Enclosed Laminar Flames (ELF) Experiment hardware which flew on STS-87.
- Engineering model hardware used for testing purposes.
- Crew required to set up and operate the experiment. Video and data down-linked to the ground for evaluation.



SPICE Experiment Assembly



Figures show two distinct microgravity smoke point phenomena (open tip and closed tip).

ISS Resource Requirements

Accommodation (carrier)	Microgravity Science Glovebox
Upmass (kg) (w/o packing factor)	38.3
Volume (m^3) (w/o packing factor)	0.096
Power (kw) (peak)	0.05
Crew Time (hrs) (installation/operations)	23.25 hours crew time
Autonomous Ops (hrs)	0
Launch/Increment	17A/Increment 19

Project Life Cycle Schedule

Milestones	SCR	RDR	PDR	CDR	VRR	Flt Safety	FHA	Launch	Ops	Return	Final Report
Actual/ Baseline	N/A	N/A	N/A	8/1999	N/A	11/2007	10/2008	5/2009	Inc. 19/20	OPS + 4 m	Return +12m