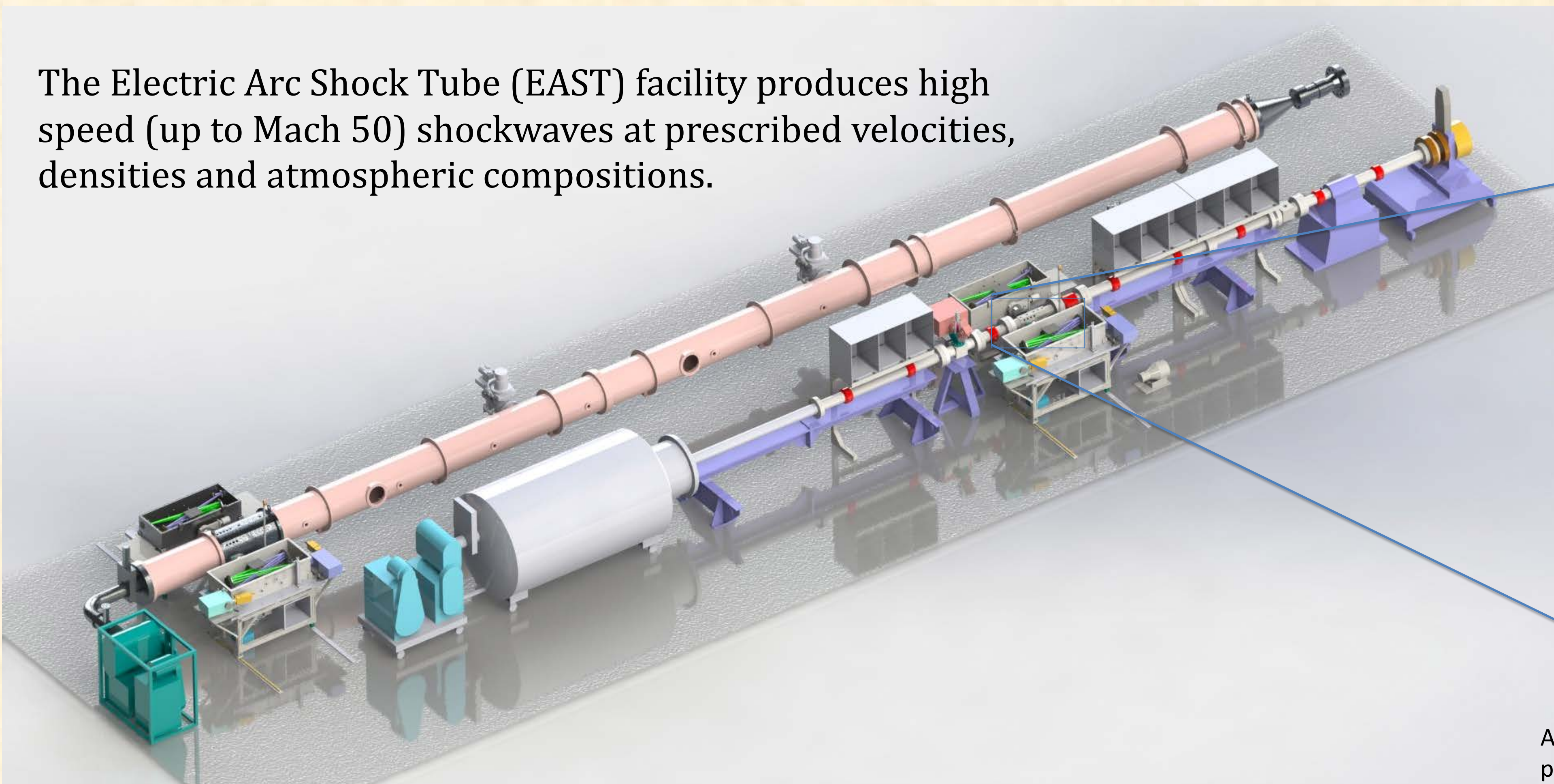


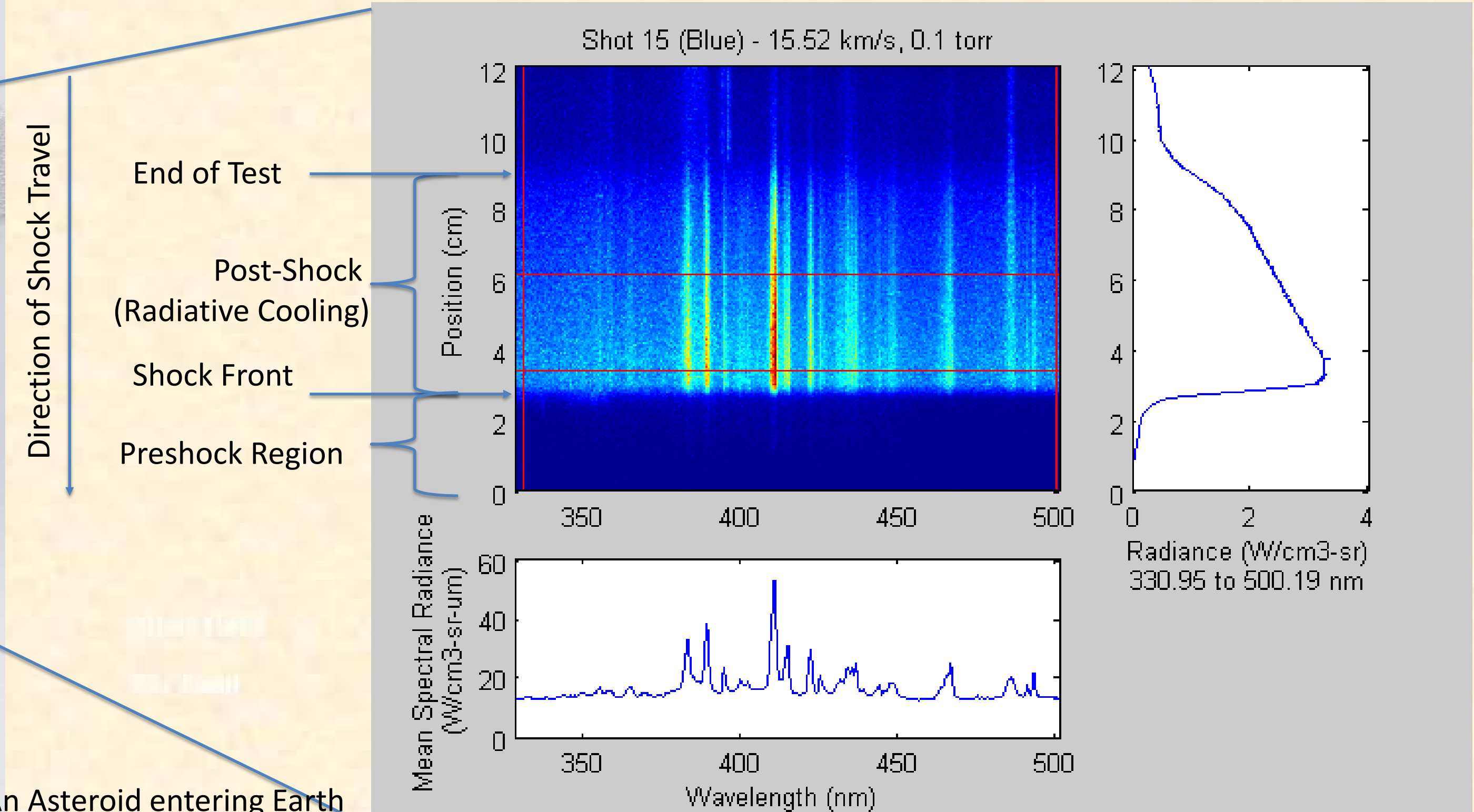
Meteor Entry Characterization in the Electric Arc Shock Tube

B. A. Cruden, D.B. Bogdanoff
 ERC, Incorporated at NASA Ames Research Center, Moffett Field, CA 94035, USA
 1st International Workshop on PHA Characterization, Atmospheric Entry and Risk Assessment
 7 – 9 July 2015, NASA Ames Research Center, California

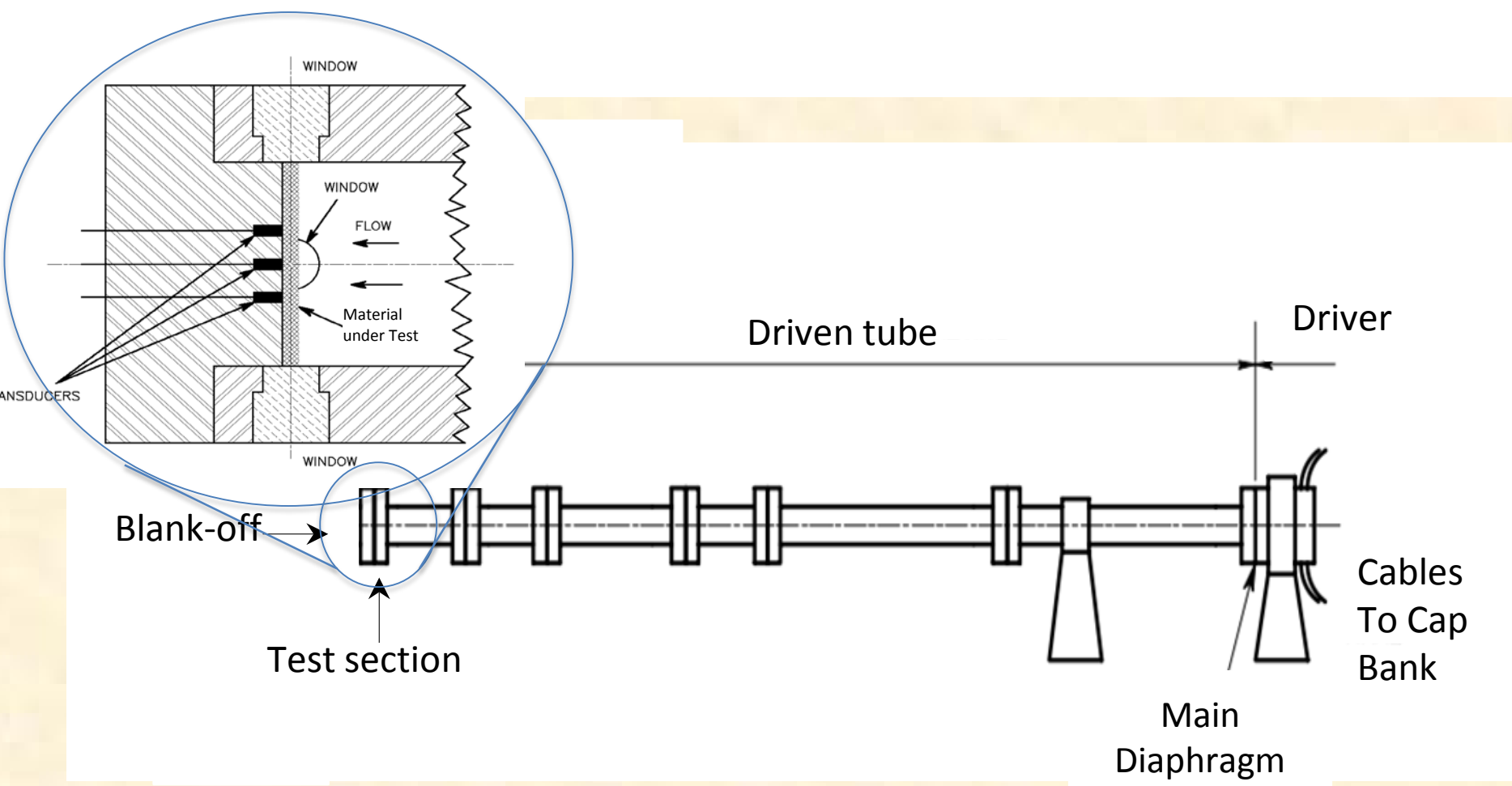
The Electric Arc Shock Tube (EAST) facility produces high speed (up to Mach 50) shockwaves at prescribed velocities, densities and atmospheric compositions.



The EAST has been used to validate radiative heating predictions for numerous planetary entries. For MPCV, uncertainty was reduced from 200 to 32% using EAST as a Validation Source

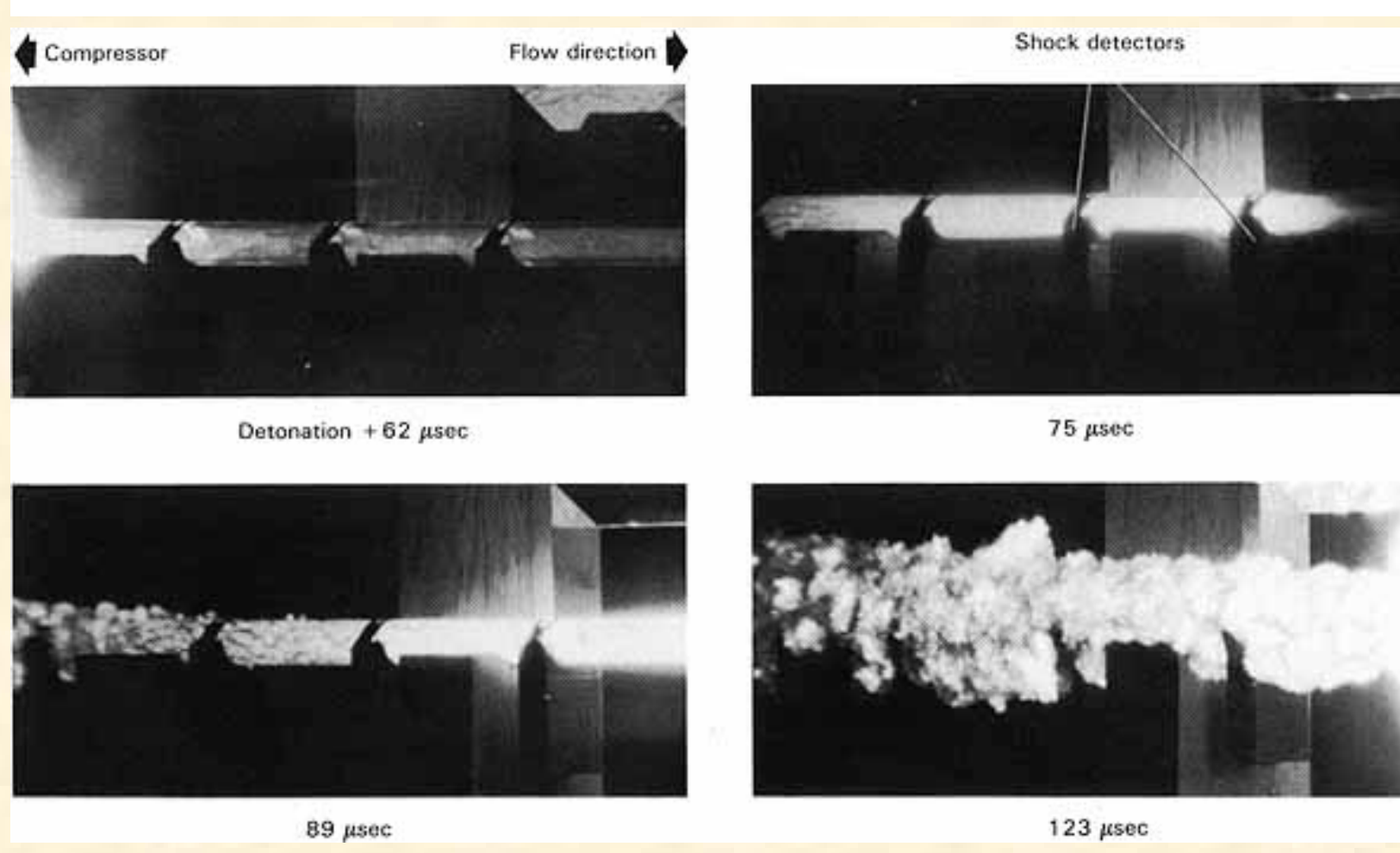


Proposed Material-Shock Interaction Configuration
 A planned facility modification in FY16 is intended to enable testing material response under short duration, high pressure/temperature reflected shocks
 Estimated Characteristics : 10 MPa, 25,000K



Beyond EAST:

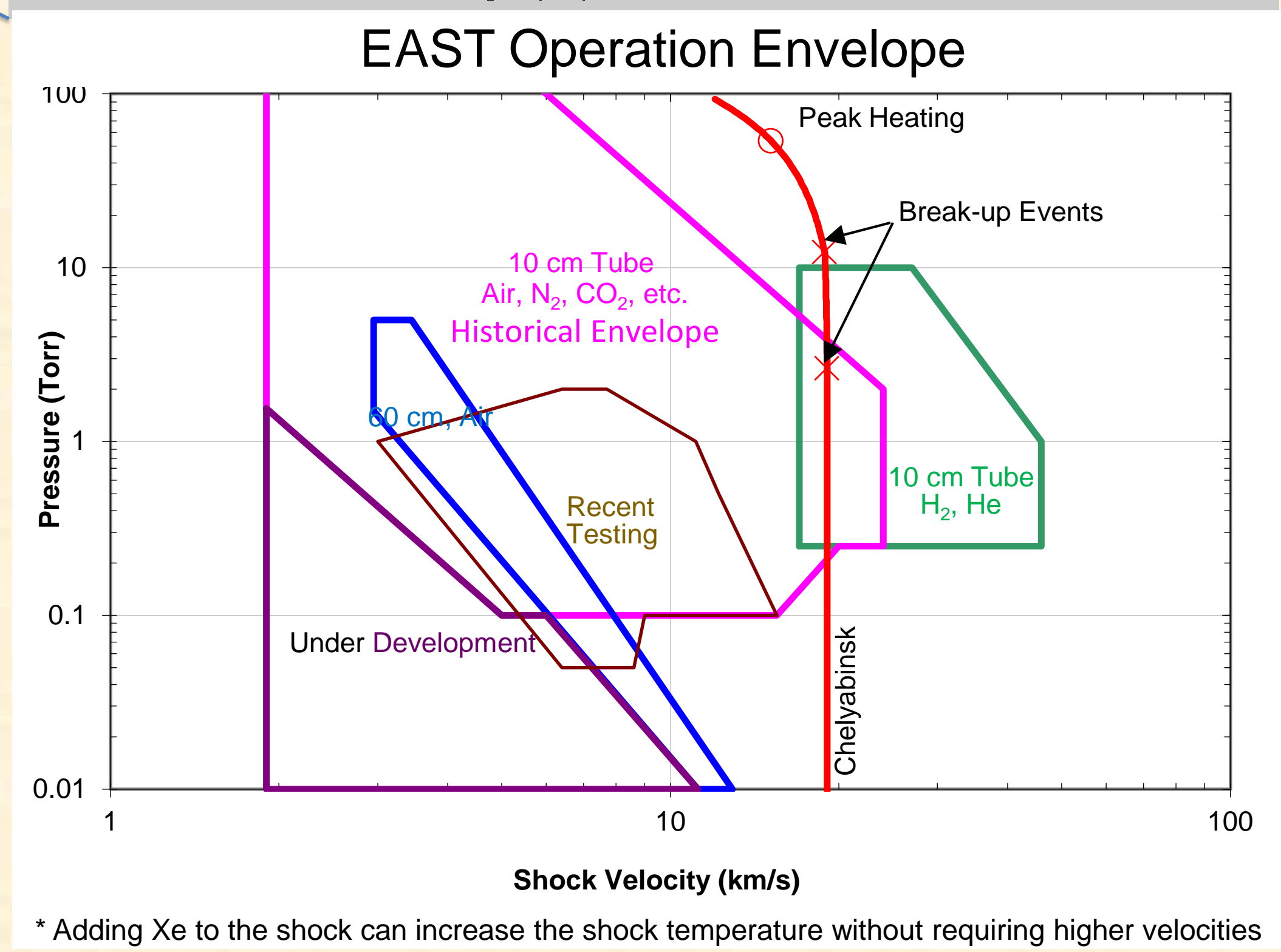
The Voitenko Compressor (ca. 1970) produced up to 67 km/s shock waves. The tube was destroyed and rebuilt with each test



An Asteroid entering Earth presents more extreme conditions than are typically studied in EAST

However, the Historical Operation Envelope does include tests that would be representative of Chelyabinsk's entry trajectory

Testing at conditions between those employed in recent tests and those required for meteor entry can validate physical mechanisms at higher enthalpy which are otherwise unvalidated



* Adding Xe to the shock can increase the shock temperature without requiring higher velocities

CONCLUSION

The EAST Facility presents multiple opportunities for simulating meteor entries in a laboratory (ground test) environment and improving/validating predictive models

Further Information:

Brett.A.Cruden@nasa.gov

ACKNOWLEDGEMENT

The present work was supported by Entry Systems Modeling program of NASA's Space Technology Mission Directorate and NASA contract NNA10DE12C to ERC, Inc.