IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2) Facilities and Operations of Microgravity Experiments (5)

Author: Dr. Hauke Müntinga University of Bremen - ZARM, Germany, hauke.muentinga@zarm.uni-bremen.de

A MISSION CONTROL SYSTEM FOR MICROGRAVITY PLATFORMS BUILT ON OPEN SOURCE TECHNOLOGIES

Abstract

On its maiden flight on Jan 23, 2017 the MAIUS-1 mission was able to demonstrate the first creation of a Bose-Einstein Condensate in space. During about 360 s of microgravity, around 100 experiments were carried out to characterize the behaviour of the condensate and its usability for atom interferometry in this environment.

To achieve these goals in the limited timeframe of a sounding rocket flight, the payload was equipped with an autonomous control system. The system was designed to optimize the experiment and decide on the next experimental sequences based on environmental conditions and previous experimental results. This includes an image evaluation algorithm and a model-based description of the experimental sequences available.

To allow monitoring and control of the instrument from the ground station, a Mission Control System was developed built entirely on Open Source technologies. This includes flow control of the experimental sequences, monitoring of housekeeping and scientific data (time-series data and images) as well as defining experimental sequences. All data are distributed via network sockets to several workstations and a timeseries database.

In this talk, we will give an overview of the architecture of these systems with a focus on the Mission Control System.