

Abstract

JUICE (Jupiter Icy Moons Explorer) is a European Space Agency (ESA) Large-Class mission that will study and provide a thorough investigation of the Jovian system. The launch is scheduled in June 2020 from Kourou on an Ariane 5 rocket. Once in orbit around Jupiter, JUICE will perform flybys of Europa, Callisto and Ganymede, collecting information about the surface composition and geology as well as searching for liquid water under the surfaces of the Galilean moons.

The JUICE payload consists of ten instruments, including a camera, spectrometers, magnetometer, and radar. One of these instruments is MAJIS (Moons And Jupiter Imaging Spectrometer), a spectrometer combining two different spectral channels: the visible (VIS) and near infrared (NIR) channel, and the infrared (IR) channel. The covered spectral range of MAJIS is 0.5 to 5.54 μm .

Before going to space, the instruments inside JUICE must be tested to certify their ability to work in the Jupiter environment. At the laboratories of the Royal Belgian Institute for Space Aeronomy (BIRA-IASB), a facility is being developed for the characterization of the VIS-NIR detector of the MAJIS/JUICE instrument. The facility is equipped with a vacuum chamber in which the flight and spare model detectors will be placed, and an optical bench to characterize these detectors. Before the laboratory characterization, the optical performances of the optical bench need to be assessed. The main objectives of this thesis are to estimate the number of electrons per pixel per second on the detectors that will be provided by the bench, the signal-to-noise ratio (SNR), and the balance between undesirable thermal emission in NIR of the bench itself and the photon flux from the light source. The system of equations as well as results from laboratory tests are fully described in this document.



Artist's impression of JUICE [ESA19a].