Status of MIRAS: The infrared synchrotron radiation beamline at ALBA

The construction of MIRAS, initiated in 2014, is advancing rapidly, and will enter the commissioning phase in 2016. Here, a brief report of its current status is given.

MIRAS will be dedicated to infrared microspectroscopy, with the aim of delivering world class performance in terms of a bright and highly stable photon beam. The beamline will provide ALBA users with a modern infrared microspectroscopy facility covering a wavelength range from 0.4 to 100 µm. The design of the beamline optimizes performance in the mid-IR range and will give significantly enhanced efficiency, compared to a conventional source, in both far-IR and mid-IR regions. The optical layout of MIRAS includes the option for splitting the extracted infrared beam in two parts, with one containing the edge radiation of the beam [1]. Each of the two parts of the split beam may be used separately at two different endstations [2] or merged together to increase flux. The experimental cabin and transport optics are designed to accommodate two additional endstations as a future upgrade of the MIRAS beamline, one that will be based on a "bring your own equipment" concept (Figure 14 (a)). The microspectroscopy instrument at the first operational endstation will be a Bruker system (Hyperion 3000 microscope coupled to a Vertex 70 spectrometer) equipped with an FPA detector for imaging.

The installation process of the beamline in-tunnel components commenced during the shutdown of the machine, summer 2015. The mechanics of the first extraction mirror M1 have been assembled and several tests were performed, including measurements for alignments and metrology, validation of the system functionality, in term of motors performance and vibration tests (Figure 15). Then, thermocouples were installed on M1, two of them on the body of the mirror and six thermocouples of 1mm diameter were installed on the back of M1 at the slot. The thermocouples will be interlocked with the RF power supply for safety reasons.

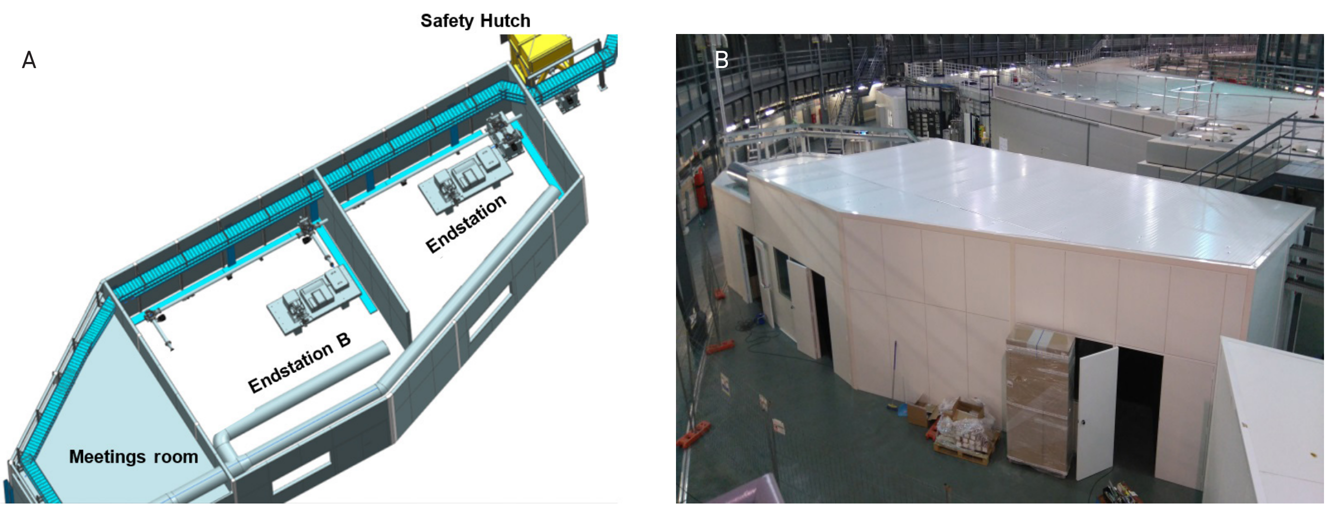

Figure 14: 3D drawings of the experimental hutch. There are two endstations hosting the three branches. Two of these branches will be coupled to a FTIR systems as indicated in the figure, the third branch will be a free station, where the users can bring their own instrument and connect it to this branch.

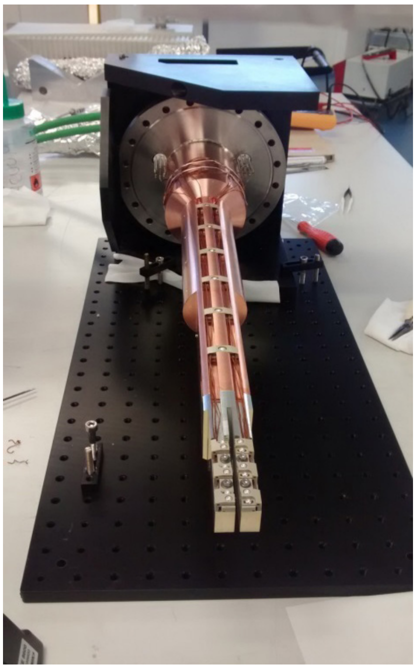

Figure 15: Assembly of the first extraction mirror mechanics. (a) Alignment procedures, (b) Motors functionality tests, (c) Metrology, Motors repeatability and Vibration tests

Figure 16: Extraction mirror M1 pre-installation. Installation of thermocouples.

Following the construction of the first mirror mechanics, the whole assembly has been placed inside the dipole chamber implementing a horizontal infrared beam extraction geometry using a laterally inserted M1 (Figure 17). M1 is made from aluminium, with 20 nm of electro deposited gold layer that is tightly clamped onto a copper holder for heat dissipation (Figure 16). After the installation of the first mirror inside the tunnel, several steps will be followed, including the installation of the transport mirrors, chambers, ion pumps etc.

In parallel to the beamline components installation, the construction of the experimental users' hutch has been initiated in September 2015. The full construction of the hutch including cabling, conditioning and light installations were ready by the end of November 2015 (Figure 14 (b)).

After the full installation of the beamline components, the commissioning of the beamline is planned to start in April 2016. Following the successful commissioning of the beamline, the first users can be welcomed officially by November 2016.

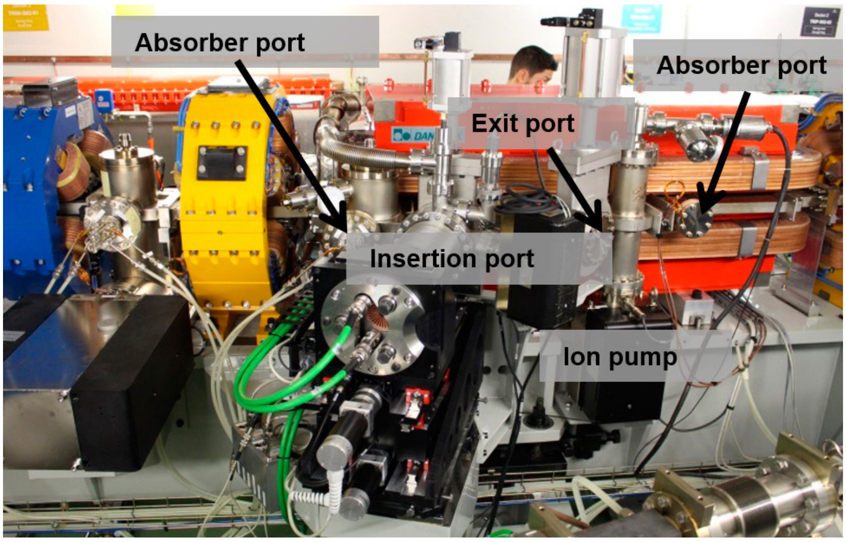

Figure 17: Installation of the extraction mirror assembly inside the tunnel in the dipole chamber.