CISUP – University of Pisa
Bruker Avance NEO 500 solid state NMR spectrometer: 2023 activity report

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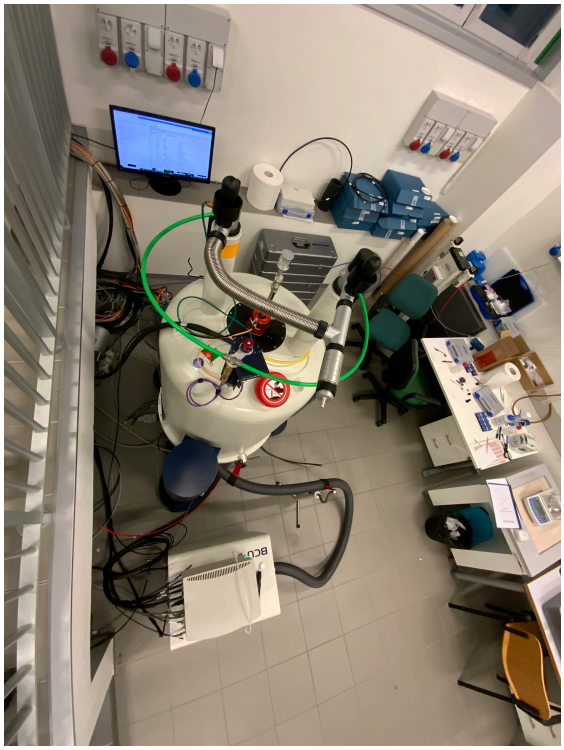

Laboratory users

The following persons have been enabled by CISUP to operate on the spectrometer:

Marco Geppi (full professor, DCCI-UniPI, lab head and responsible of the spectrometer)
Silvia Borsacchi (ICCOM-CNR researcher)
Lucia Calucci (ICCOM-CNR researcher)
Elisa Carignani (ICCOM-CNR researcher)
Claudia Forte (ICCOM-CNR researcher, until February 2023)
Francesca Martini (RTDB, DCCI-UniPI)
Francesca Nardelli (RTD, ICCOM-CNR)
Silvia Pizzanelli (ICCOM-CNR researcher)

The technical service concerning the refill of cryogenic liquids (nitrogen and helium) is guaranteed by DCCI.

Once again, we highlight the urgent need of an expert technician, able to follow the every-day tasks and perform experiments. This would be strictly necessary, but such a person is not present at the moment. The recruitment of a person with a strong background in solid state NMR is necessary and strongly requested to improve the efficiency of the activities connected with this spectrometer.

Days worked

The total spectrometer working time in 2023 was 223 days over a maximum of 239. Only working days (from Monday to Friday) were taken into account here, but usually the spectrometer ran experiments even during the weekends without operators or with operators handling the experiments remotely from home.
The spectrometer did not operate for a total of 16 working days:

- From 2nd to 5th January for works at the compressed air departmental system;
- The 17th February for yearly maintenance of air-drying columns of the spectrometer done by operators;
- The 14th, 15th and 20th March due to tuning problems of the 2.5-mm CPMAS probe;
- From 1st to 4th August for unavailability of operators due to simultaneous institutional duties and/or season holidays..
- The 21st and 22nd August for maintenance of the departmental electric cabins;
- The 16th October and 3rd November for problems of sample rotation and maintenance done by the operators the MAS unit.

The following activities have been carried out (the percentages refer to the effective working+maintanance days):

Set-up operations and developments: 39 days (17.3 %)
Maintenance done by operators: 3 days (1.3 %)
“In house” research activity: 56 days (24.8 %)
Free CNR research activity: 56 days (24.8 %)
Paid activity for UNIPI/CNR customers: 58 days (25.7 %)
Paid activity for external institutions: 14 days (6.2 %)

Incomes and costs

In 2023 incomes arose mainly from activity to UNIPI and CNR researchers (11566.94 €), and to other institutions (7600 €), for **a total of 19166.94 €**. Part of the incomes, due to bureaucratic difficulties, are in the process of being collected (2150 € from ICCOM-CNR).
On the other side, the maintenance costs of the spectrometer were kept to a very low level since in the contract for the acquisition of the spectrometer from Bruker a 3-year warranty of the newly acquired components was included, covering most technical services. It must be noted that this agreement was re-negotiated in 2020 with Bruker, obtaining a 2-month extension of the warranty period. The deadlines for the different components were all during 2023 as indicated in the following:

- Ascend 500 magnet; new RF components upgrading CNR console; BCU II; MASIII; CPMAS 1.3mm probe: 5/2/2023
- CPMAS 2.5mm probe: 3/9/2023
- CPMAS 4mm probe: 26/4/2023
- CPMAS 3.2mm low-gamma probe: 31/8/2023
- HRMAS 4mm probe: 3/9/2023

Some breakages occurred during 2023 were solved by repairs within the warranty.
However, at the end of 2023, warranty was expired for all the components of the spectrometer, making urgent the ***activation of a maintenance program with Bruker***.

In 2023 the costs (IVA included) were relative only to:

- cryogenic liquids (nitrogen and helium) for ordinary maintenance of the superconducting magnet: 4290.00 €.

for a total of **4290.00 €**

Therefore, the SSNMR spectrometer produced this year a **net income of 14876.94 €.**
This, added with the total net income at the end of 2022 (9717.97 €), results in a **total net income from the beginning of the activities of 24594.91 €.**