

The DAPHNE NFDI Consortium

Data from PHoton and Neutron Experiments

15 October 2019

1.2 Summary of the proposal

The X-ray and neutron science communities encompasses users from a broad range of scientific disciplines facing a common need for high-level, rapid data analysis and the challenge of implementing research data management. The communities of science users are represented by the KFS and KFN committees, which have worked together for many years and are coming together here to meet common challenges imposed by the digital transformation of experiments. The DAPHNE consortium serves the broad community of users employing a wide range of X-ray and neutron techniques, comprising more than 5000 scientists throughout Germany. The community performs thousands of individual user experiments at central facilities every year, across many disciplines and using a range of techniques and a diverse instrumentation. Individual experiments can produce millions of files and in some cases over 700TB data per week, depending on the experimental configuration. Moreover, the community is currently witnessing a fundamental change in both the amount of data recorded and the corresponding data rates triggered by the increase in the brightness of the sources themselves (X-ray free-electron lasers, high-brightness storage rings and new neutron facilities) and by the rapid increase in the size and speed of modern detectors.

DAPHNE brings together users representing key scientific application domains with the large-scale research facilities in X-ray and neutron science in order to advance the state of data management in the community. Uniquely, DAPHNE engages directly with the user community to develop user-driven data solutions to advance science experiments. Broadly, we will provide the following tangible infrastructure through DAPHNE for the wider photon and neutron community:

1. Improve metadata capture through user-driven online logbooks linked to the data collection, thus enabling a richer capture of information about the experiments than is currently possible;
2. Establish a community repository of processed data, new reference data bases and analysis code for published results, linked where possible to raw data sources, to enable data and software re-use within the community; and
3. Develop, curate and deploy user-developed analysis software on facility computing infrastructure so that ordinary users can benefit from and repeat the analysis performed by leading power user groups through common data analysis portals.

DAPHNE builds on a tradition of very close interaction between user communities driving the scientific and technical developments of the facilities and is a key element of DAPHNE. The consortium consequently comprises the user facilities and users at large-scale instruments such as the X-ray sources PETRA III and FLASH at DESY, BESSY II at HZB, the European-XFEL, the ELBE Center for High-Power Radiation Sources at HZDR, as well as the Heinz Maier Leibnitz Centre with its neutron source and laboratory instruments with related data.