

## The Dynamic Metadata Schema in Neutron and Photon Communities: A Case Study of X-Ray Photon Correlation Spectroscopy

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**Abstract :** Metadata stands at the forefront of advancing data management practices within research communities, with particular significance in the realms of neutron and photon scattering. This paper introduces a groundbreaking approach—dynamic metadata schema—within the context of X-ray Photon Correlation Spectroscopy (XPCS). XPCS, a potent technique unravelling nanoscale dynamic processes, serves as an illustrative use case to demonstrate how dynamic metadata can revolutionize data acquisition, sharing, and analysis workflows. This paper explores the challenges encountered by the neutron and photon communities in navigating intricate data landscapes and highlights the prowess of dynamic metadata in addressing these hurdles. Our proposed approach empowers researchers to tailor metadata definitions to the evolving demands of experiments, thereby facilitating streamlined data integration, traceability, and collaborative exploration. Through tangible examples from the XPCS domain, we showcase how embracing dynamic metadata standards bestows advantages, enhancing data reproducibility, interoperability, and the diffusion of knowledge. Ultimately, this paper underscores the transformative potential of dynamic metadata, heralding a paradigm shift in data management within the neutron and photon research communities.

**Keywords :** metadata, FAIR, data analysis, XPCS, IoT

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