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Archaeometry with Prompt Gamma Activation Analysis, In-Beam Neutron Activation Analysis and Neutron Tomography at the PGAA instrument of MLZ

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The low-destructive nature of many neutron-based analytical techniques is a main argument for their application in archaeometry. Further advantages of these methods are the little sensitivity for the matrix composition, easy sample preparation and fairly low detection limits. A combination of two or more of these methods broadens the application possibilities. For instance, prompt gamma activation analysis (PGAA) and neutron activation analysis (NAA) are complementary techniques, so that combining them can significantly increase the number of the detectable elements. This is especially useful for studies needing as much information as possible like provenance research. At the PGAA instrument of the Heinz Maier-Leibnitz Zentrum (MLZ) in Garching (Germany) we use this approach e.g. for the provenance analysis of stone material from the UNESCO world heritage site Lorsch Abbey – a unique remnant of the Carolingian age. For the comparison of the geochemical fingerprints multivariate statistic methods are used, which makes it possible to assign the findings to certain deposits. This information is useful for archaeologists who try to reconstruct ancient trade and transport routes and identifying re-used stones from old Roman (so-called spolia). It makes also sense to combine PGAA and neutron tomography (NT) to get information about both –the inner structure and the elemental composition of archaeological artefacts. It can help to shed light on ancient handicraft techniques, for instance. We recently investigate Celtic burial gifts in this context. In the presentation we will provide information about our recent projects, the results and the developments at the PGAA instrument of the MLZ.

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