

USE OF ACCELERATORS TO PRESERVE CULTURAL HERITAGE OBJECTS AND DETECT FORGERIES.

Lucile Beck

LMC14, LSCE/IPSL, CEA-CNRS-UVSQ, Université Paris-Saclay - Gif Sur Yvette, France

In the last decades, technological developments of the Ion beam Analysis (IBA) and Accelerator Mass Spectrometry (AMS) techniques have expanded the field of applications allowing to contribute to the preservation of cultural heritage objects as well as the detection of art forgeries.

In this talk, examples of the use of the nuclear and isotopic techniques for the preservation of museum objects and the attribution of artworks will be presented.

In an extensive study of ancient Egyptian musical instruments, AMS ^{14}C was used not only to date them, but also to document their history from their discovery at the beginning of the 19th century to their present preservation conditions in the museums (*Quiles et al., Radiocarbon 63, 2021*). It was thus possible to distinguish original pieces from later restorations for a better knowledge of their production as well as for their presentation in an exhibition on ancient music.

For the restoration of a Japanese folding screen composed of metal plates, IBA determined the composition of multiple complex copper alloys used for the colored decoration. The analysis results helped the curator and restorer to determine the appropriate and safe cleaning procedures (*Pacheco et al., in preparation*).

IBA and AMS also contribute to detect forgeries (*Calligaro et al., Appl. Phys.A 94, 2009; Xihuitl, le bleu éternel, catalogue, 2011; Caforio et al., Eur. Phys. J. Plus 129, 2014; Hendricks et al., PNAS 116, 2019*). AMS radiocarbon dating was applied to Impressionist paintings of the beginning of 20th century, in the context of a police investigation. ^{14}C measurements show that the plants used to make the canvas were harvested after 1955, that is to say at least 10 years after the death in the 40s of the alleged artists, revealing that the paintings are recent forgeries (*Beck et al., accepted in FSI*).

Finally, ^{14}C AMS demonstrated the misattribution of the Flora bust of the Bode-Museum (Berlin) to Leonardo da Vinci (*Reiche et al., Scientific Reports, 2021*).