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# Compact Particle Accelerators for Cultural Heritage Applications

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Particle accelerators, such as Synchrotron light sources and Ion Beam Accelerators, are powerful tools for discovery, enabling across many scientific fields including cultural heritage. However often cultural heritage objects and artefacts cannot be taken outside of their country of origin due to legal restrictions or burdensome bureaucracy. Similarly, museum curators are often hesitant to risk moving valuable artworks and the insurance and security costs of transporting artworks can be prohibitively expensive. These factors can restrict access to accelerator-based facilities, keeping heritage science secrets undiscovered. A portable 2 MeV proton accelerator would allow us to bring to the accelerator to countries and regions that don't have local access to accelerator facilities for researchers to conduct non-destructive, non-invasive measurements.



Figure 1: 2MV STAR Tandem Accelerator at ANSTO Lucas Heights.

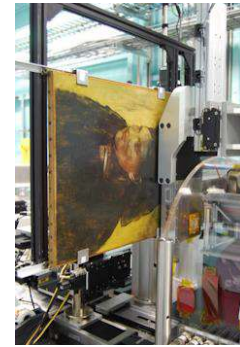


Figure 2: Degas painting being analysed on the XFM beamline at the Australian Synchrotron. Image: David Thorrowgood.

## Student Opportunities:

In this project, you will investigate: compact cyclotron accelerator design, beam quality and transport optimisation, with further opportunities available as driven by the student's interest. The research will involve theoretical and computational beam dynamics studies, with a separate opportunity to gain hands-on experience contributing to machine studies at the Australian Synchrotron.

Previous experience in Accelerator Physics is not necessary, as this area of physics is rarely covered in undergraduate degrees. Interest in electromagnetism, applied physics, and/or computational physics, would be beneficial. PhD students receive training and supervision in Accelerator Physics, with the opportunity to attend international accelerator schools and conferences.