ATOMS FOR HERITAGE
IAEA

IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Joint IAEA–ANSTO Workshop on Nuclear and Isotopic Techniques for Cultural Heritage

Virtual Event

Hosted by:
Australian Nuclear Science and Technology Organisation (ANSTO), Lucas Heights NSW Australia

6–9 December 2021

culturalheritage@ansto.gov.au
www.ansto.gov.au
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Australian Government

ANSTO

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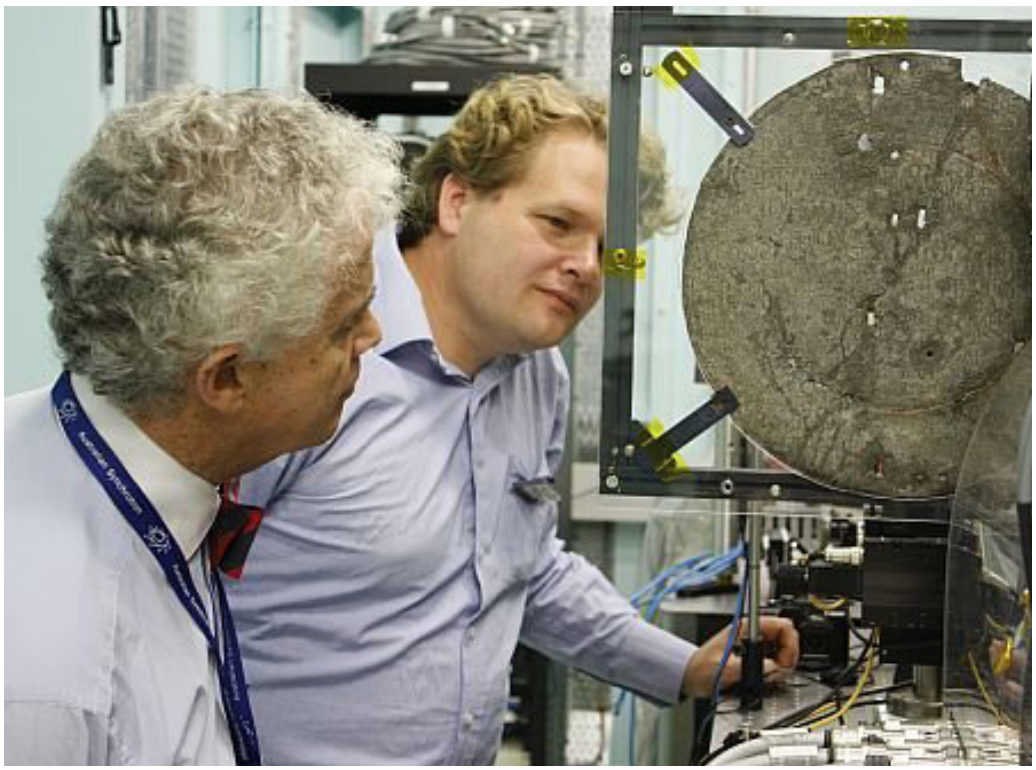


Introduction

In February 2021 ANSTO became an International Atomic Energy Agency (IAEA) Collaborating Centre to support IAEA activities using nuclear techniques for development and sustainable environment protection (see IAEA and ANSTO websites for more details). Building on two previous Collaborating Centres, the current Agreement is focused on a broad work plan that includes tackling provenance and the authentication of products of illicit trade; the use of isotopes to study water and climate change; the use of nuclear techniques to understand the impact of environmental and atmospheric pollutants and the use of nuclear and isotopic techniques to investigate art, archaeology and cultural heritage materials. As part of this new collaborating centre, we have planned to organize a series of activities to introduce the latest research works and results as well as innovative technological developments.

We are proud to announce the first meeting: the Joint **IAEA–ANSTO Workshop on Nuclear and Isotopic Techniques for Cultural Heritage** which will be organized together with the IAEA and hosted as an on-line meeting by ANSTO from **6 to 9 December 2021**.

(Left to right) Prof Henk Heijnis and Dr Suzanne Hollins with the new plaque that will be displayed in the Reception Building at the Lucas Heights campus

Background

Over the last decades, neutron, photon, and ion beams have been established as an innovative and attractive investigative approach for the study and conservation of cultural heritage. ANSTO offers a wide range of unique nuclear-beam techniques to look at the structure and dynamics of materials from the atomic to the macroscopic scale providing complementary information. These powerful and versatile tools are superb probes to be used in tandem with traditional methods to extract maximum information from an object requiring either minimal or no sampling or invasive procedures.

Collaboration between institutions, countries, and experts across a variety of disciplines are critical ingredients to reading the deep past. The big breakthroughs which change our thinking and knowledge are expected to come at the intersection of the major disciplines. Increasingly apparent to scientists, science policy makers and governmental agencies is that an understanding of mankind's past and its impact on the environment is central to tackling the problems of global warming, biodiversity, landscape management and sustainability.

Objectives

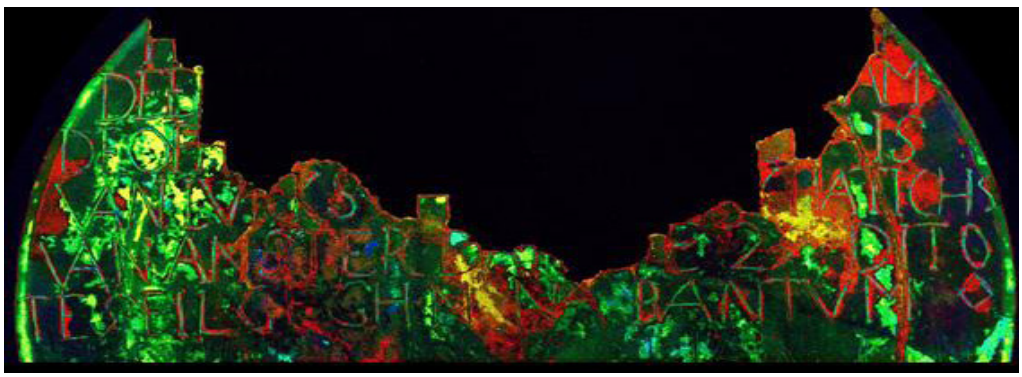
The overall objective of this Workshop is to provide a forum for physicists, material scientists, chemists, archaeologists, conservators, curators, and heritage science stakeholders in order to exchange ideas and information on the application of nuclear and isotopic techniques for cultural heritage, conservation science and archaeology.

The main objective of the event is to contribute to the enhancement of scientific-technological knowledge, innovation infrastructure and human resources training in the area of cultural heritage using nuclear and isotopic techniques. The event also aims to provide a platform to further enhance the nexus between Arts and Science by promoting linkages between the collaborating centre activities and regional collaborators through a synergistic use of various nuclear techniques for the characterisation and preservation of our heritage.

Expected Outputs

Through scientific presentations and brainstorming discussions, this Workshop is aimed to deliver the following expected outputs:

- To introduce the latest scientific analytical tools which are offered across ANSTO facilities- including neutron, synchrotron, and accelerator-based techniques – to Australian and international partners and scholars from museums, research centres and universities
- To promote the use of nuclear and isotopic techniques in the research fields of Cultural Heritage, Conservation Science and Archaeology. This will be tailored to novice potential users of ANSTO research facilities.
- To train and update Higher Degree Research (HDR) students on nuclear and isotopic techniques. Students attending will have access to current research and researchers and will have the opportunity to discuss their research.
- To provide a platform to further explore the nexus between Arts and Science.
- To initiate and foster international collaborations and develop strategies for multi-national research projects.
- To identify joint interests in major projects underway in the institutions of the participants, the major stakeholders in the research outcomes.
- To identify the key research organisations, museums, curators, funding agencies and other actors of importance to the field to explore linkages and pursue regional collaborations along the regional priorities with a special attention to the Asia-Pacific region.
- To discuss gaps and needs; and propose activities for the IAEA-ANSTO Collaborating Centre, that will facilitate further development and use of nuclear and isotopic techniques in the field of Cultural Heritage, Conservation Science and Archaeology research.



Target Audience

The event is intended for young and experienced scientists, archaeologists, conservators, curators and heritage science stakeholders actively involved in the field of characterisation, provenance and authentication of cultural heritage objects and materials with nuclear and complementary analytical techniques.

Working Language

EN

The official language of the meeting is English (*no interpretation will be provided*).

Structure

The meeting will be held as a virtual meeting using an online platform to be confirmed.

The meeting will have invited and contributed oral papers presented in sessions devoted to special topics, with subsequent discussions. It is expected that talks by ANSTO experts, as keynotes, will be 40 minutes long, including a 10 minute discussion, while contributed talks will be 20 minutes long, including a 5 minute discussion. A poster session will be also organized.

It is expected that the meeting will start at 9 a.m. on **6 December 2021** and finish by 4 p.m. on **9 December 2021** (Sydney time zone, UTC +11).

A summary session will be held on **9 December 2021** to review the activities and conclusions drawn at the meeting that will be documented in a final report. Directions for future research will be also discussed and presented.

Image of ANSTO OPAL Reactor Building - Lucas Heights, Sydney Australia

Topics

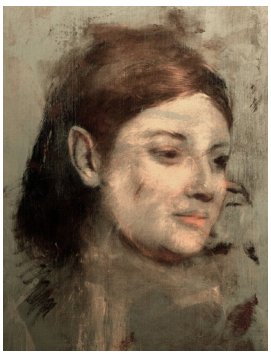
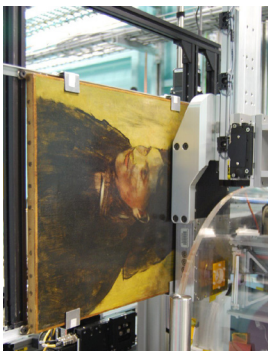
The event will comprise on-line sessions. The on-line sessions will consist in presentations by ANSTO experts in sessions devoted to specific topics, and presentations by the participants on their research. The on-line sessions will consist of technical presentations on basic theory followed by demonstrations using nuclear techniques available at ANSTO through selected case studies. The presentations will be tailored for novice to intermediate users from the research fields of Cultural Heritage, Conservation Science and Archaeology. The topics will include:

- Neutron and synchrotron X-ray imaging for structural tri-dimensional characterization
- Full-pattern Neutron Diffraction technique for structure and phase determination, Neutron Diffraction Residual Stress and Texture Analysis for the characterization of the preferred orientation and lattice deformations of the crystalline structure to clarify the manufacturing processes
- Neutron activation analysis for provenance study;
- Ion Beam Analysis (IBA) for elemental analysis;
- Accelerator Mass Spectrometry (AMS) as an ultra-sensitive method for isotopic dating
- THz/Far-IR spectroscopy for the characterization of pigments and other cultural heritage materials;
- X-ray Fluorescence microscopy maps for elemental distribution and for a range of spectroscopic applications such as determining oxidation state and speciation
- Scanning electron microscope (SEM), focused ion beam (FIB), and transmission electron microscopy (TEM);
- Overview of the most utilised portable equipment for the investigation of cultural heritage
- Introduction to the IAEA e-learning platform and courses on Heritage Science
- Mechanism to access research infrastructure and how to write a successful proposal

Internationally recognised researchers who work professionally with nuclear and isotopic techniques will provide overviews on how to integrate results of the analytical techniques into wider scope of Cultural Heritage research.

As part of the workshop, the participants will be involved in a roundtable discussion to provide recommendations that will help to explore key topics that are relevant to Member States, especially developing countries, that are considering establishing or developing their collaboration in the field of Cultural Heritage, Conservation Science and Archaeology.

A final session of the meeting will be dedicated to summarizing and reviewing activities and recommendations.


International Programme Advisory Committee (IPAC)

The IPAC will advise the meeting co-chairs on establishing links with institutions and stakeholders dealing with Cultural Heritage, Conservation Science and Archaeology.

Prof Loïc Bertrand
Université Paris-Saclay
ENS Paris-Saclay France

Dr Elisabeth Carter
The University of Sydney
Sydney NSW Australia

Dr Douglas Galante
The Brazilian Synchrotron Light Laboratory (LNLS)
The Brazilian Center for Research in Energy and Materials (CNPEM) Campinas (SP)
Brazil

Dr Francesco Grazzi
Istituto di Fisica Nello Carrara
Centro Nazionale delle Ricerche
Sesto fiorentino Italy

Dr Irka Hajdas
Laboratory of Ion Beam Physics, ETH,
Zürich Switzerland

Participation and Registration

All persons wishing to participate in the event have to be designated by an IAEA Member State or should be members of organizations that have been invited to attend.

In order to be designated by an IAEA Member State, participants are requested to send the Participation Form (Form A) to their competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) for onward transmission to the IAEA by **1 November 2021.** Participants who are members of an organization invited to attend are requested to send the Participation Form (Form A) through their organization to the IAEA by above deadline.

Selected participants will be informed in due course on the procedures to be followed with regard to administrative and technical matters.

Participants are hereby informed that the personal data they submit will be processed in line with the Agency's Personal Data and Privacy Policy and is collected solely for the purpose(s) of reviewing and assessing the application and to complete logistical arrangements where required.

About 40-50 people from IAEA Member States and international organizations are expected to attend. Participants should be persons actively involved in the topics of the meeting like physicists, material scientists, chemists, archaeologists, conservators, and curators. HDR students from cultural Heritage, Conservation Science, and Archaeology, and associated fields are particularly encouraged to participate. Museum, art gallery, and cultural-heritage experts are also welcome.

Papers and Presentations

The IAEA encourages participants to give presentations on the work of their respective institutions that falls under the topics listed above.

Participants who wish to give presentations are requested to submit an abstract of their work. The abstract will be reviewed as part of the selection process for presentations. The abstract should be in A4 page format, should extend to no more than 2 pages (including figures, photographs and tables) and should not exceed 1000 words. It should be sent electronically to Ms Aliz Simon, Scientific Secretary of the event (see contact details below), not later than 1 November 2021. Authors will be notified of the acceptance of their proposed presentations by **15 November 2021**.

In addition, participants have to submit the abstract together with the Participation Form (Form A) and the attached Form for Submission of a Paper (Form B) to their competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority) or their organization for onward transmission to the IAEA not later than **1 November 2021.**

Additional Information

1. IAEA PARTICIPATION

A participant will be accepted only, if the Participation Form A is transmitted to the IAEA through the appropriate Governmental representative authority (e.g. Ministry of Foreign Affairs, National Atomic Energy Authority) by **1 November 2021.**

Those who would like to present their results either as an oral or poster contribution are requested to submit an abstract and **Form B** together with **Form A** through the appropriate Governmental representative authority.

Please kindly indicate at the end of the abstract your preference for oral or poster presentation.

2. ABSTRACT SUBMISSION

A one-page abstract is to be submitted by **1 November 2021**. The abstract may be text only or include figures. The abstract must include the authors' names, affiliation and email addresses. Acceptable file formats are Microsoft Word (preferred) or PDF. The filename should be in the following format: "**lastname. firstname.filetype**".

Authors must make sure that the files do not include copyrighted fonts or any other impediments for reproduction. The abstracts will be reviewed and selected by the International Programme Advisory Committee. Authors will be informed of the acceptance of their contributions via email by **15 November 2021**.

Beside the official governmental channel, please kindly submit the abstract electronically also directly to the meeting co-chairs before the deadline:
Aliz.Simon@iaea.org, culturalheritage@ansto.gov.au
Subject: **Nuclear and isotopic techniques for cultural heritage**

A **maximum of 2 contributions** will be selected from each Member States. Participants will be selected based on their contribution and expertise to best fit to the workshop objectives and its programme.

Additional Requirements

Participant wishes to present an oral or poster presentation	Participant with no presentation
Form A Form B and abstract with oral or poster presentation preference	Form A

A questionnaire is part of the selection process and will be sent to participants upon receipt of the endorsed forms.

Publication

A Book of Abstracts will be compiled for free distribution during the meeting to every participant. A meeting report will be prepared during the meeting and distributed to each meeting participant.

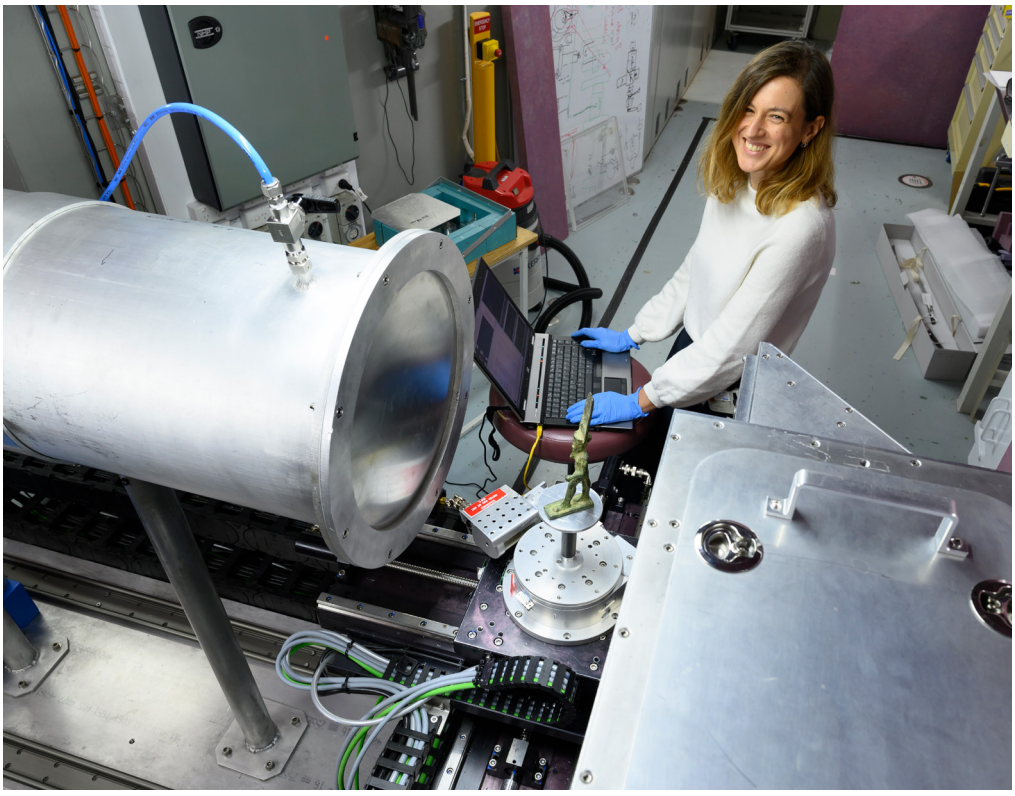
Expenditures and Financial Support

The costs for the organization of the meeting are borne by ANSTO and the IAEA.

No registration fee will be charged to participants attending the meeting.

Important Deadlines

1 November 2021	Nominations to be sent to the IAEA and submission of abstracts according to the instructions above for selection
15 November 2021	Letter of invitations are sent to the accepted participants by the IAEA. Participants are informed on the acceptance of the abstract
30 November 2021	Information on the meeting agenda, platform and remote connections are sent to the meeting participants
6 December 2021	Meeting begins



Dr Floriana Salvemini

Workshop Co-Chairs

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Division of Physical and Chemical Sciences Department of Nuclear Sciences and Applications International Atomic Energy Agency Vienna International Centre PO Box 100 1400 VIENNA AUSTRIA	

Subsequent correspondence on scientific matters should be sent to the Scientific Secretary and correspondence on other matters related to the event to the Administrative Secretary.

Event Web Information

Please visit the following three (3) web pages regularly for new information regarding this event:

ANSTO | IAEA | Accelerators for Heritage

Images of Real japanese samurai sword and sheath on wooden board

Images of Wanjina, shown here at Donkey Ridge in the north-western Kimberley region of WA, are characterised by halo-like headdresses, mouthless faces, and large, round eyes. (Image Grahame Walsh / courtesy Rock Art Australia)