



IAEA

International Atomic Energy Agency

Atoms for Peace and Development

**Joint IAEA–Fluminense Federal University
Workshop on Radiocarbon Accelerator Mass
Spectrometry for Cultural and Natural
Heritage Preservation in Latin America**

**hosted by the Government of Brazil through
the Fluminense Federal University**

4 – 8 November 2024

Ref. No.: EVT2304287

Information Sheet

Introduction

Accelerator Mass Spectrometry (AMS) enables the separation of isotopic masses and detection of abundance of isotopes. Radiocarbon dating is based on the detection of ^{14}C isotope (radiocarbon), which is typically carried out nowadays with AMS. In AMS radiocarbon dating, the ^{14}C content is directly measured relative to the two stable ^{12}C and ^{13}C carbon isotopes. This technique is especially useful to determine the age of objects including their organic components. The ^{14}C half-life of $5,700 \pm 30$ years, makes it possible to determine the age over the past 55,000 years. The IAEA Accelerator Knowledge Portal [1] provides a world-wide database of Accelerator Mass Spectrometry Laboratories.

The versatility of applications for Accelerator Mass Spectrometry radiocarbon dating technique (^{14}C -AMS) is presented in several studies that contribute to a better understanding both in the field of natural and cultural heritage, environmental science, forensic science, etc. [2,3]. Examples of interdisciplinary research involving ^{14}C isotopes include the chronological analyses of archaeological sites and investigations of environmental archives revealing of climate and ocean changes. Such a diverse range of applications has been acknowledged by the scientific community, leading to the establishment of several international conference series (e.g., Radiocarbon in the Environment, Radiocarbon and Archaeology, Radiocarbon and Diet) that provide platforms for focused discussions.

As being the first ^{14}C -AMS facility in Latin America, the Radiocarbon Laboratory of the Fluminense Federal University (LAC-UFF) [4,5] holds a unique position to contribute to the advancement of radiocarbon research within the region. In this context, in response to an increasing demand from the Latin American radiocarbon scientists and end-users; the LAC-UFF initiated the Conferencia Latinoamericana de Radiocarbono (CLARA). So far two successful conferences have been held in Brazil and Mexico in 2019 and 2023, respectively. Through these events, researchers and students from Latin American institutions had the opportunity to extend their network and benefit from scientific interactions with internationally renowned researchers from the field. To further foster multi-disciplinary collaborations, engage new partners and share and transfer knowledge; the International Atomic Energy Agency (IAEA) and LAC-UFF are jointly organizing a workshop on the applications of ^{14}C -AMS for Cultural and Natural Heritage Preservation in Latin America.

The workshop combines LAC-UFF's commitment to foster the network of Latin American radiocarbon scientists with the IAEA's mission to support Member States in strengthening their capabilities and utilizing nuclear analytical techniques for the preservation of cultural and natural heritage including partners also from e.g. environmental science, humanities and social sciences. The workshop also responds to regional climatic challenges, such as increased frequency and intensity of extreme events, which can impact natural and cultural heritage in the region and is aligned with UNESCO Policy on climate action for World Heritage [6]. The workshop is organised with the involvement of IAEA's Marine Environment Laboratories in Monaco, supporting the topics on natural heritage.

The workshop will be held at the Physics Institute of the Federal Fluminense University, where the LAC–UFF facilities are located. Participants will be introduced to the fundamentals of the Accelerator Mass Spectrometry radiocarbon dating technique, then various applications will be presented through case studies and hands-on exercise on sample preparation, analysis, and calibration techniques, to provide real laboratory experience to better understand the processes, will complete the workshop. The various applications will be discussed in the context of Latin American natural and cultural heritage.

Additional information on the IAEA efforts to pursue the utilization of accelerator-based analytical techniques for cultural and natural heritage through research and development: “Accelerators for Heritage” can be found in its website [7]. The IAEA e-learning course on “Accelerator Mass Spectrometry Radiocarbon Dating for Heritage and Forensic Science” [8] is primarily developed for young professionals, post-graduate and under-graduate students with multi-disciplinary background.

References:

- [1] IAEA Accelerator Knowledge Portal: <https://nucleus.iaea.org/sites/accelerators/Pages/>
 - [2] W. Kutschera, A. J. Timothy Jull, M. Paul, A. Wallner, Atom counting with accelerator mass spectrometry, *Reviews of Modern Physics*, Volume 95, 2023, 035006, DOI: 10.1103/RevModPhys.95.035006
 - [3] A. Simon, N. Pessoa Barradas, C. Jeynes, F.S. Romolo, Addressing forensic science challenges with nuclear analytical techniques – A review, *Forensic Science International*, Volume 358, 2024, 111767, ISSN 0379-0738, <https://doi.org/10.1016/j.forsciint.2023.111767> (open access)
 - [4] <https://lac.uff.br/eng/home/>
 - [5] Macario KD, Gomes PRS, Anjos RM, et al. The Brazilian AMS Radiocarbon Laboratory (LAC-UFF) and the Intercomparison of Results with CENA and UGAMS, *Radiocarbon* 2013;55(2):325-330, DOI: [10.1017/S003382220005743X](https://doi.org/10.1017/S003382220005743X)
 - [6] Updated Policy Document on climate action for World Heritage, Twenty-fourth session of the General Assembly of States Parties to the Convention concerning the Protection of the World Cultural and Natural Heritage; UNESCO Headquarters, Paris, France, 22-23 November 2023, <https://whc.unesco.org/archive/2023/whc23-24ga-INF8-en.pdf>
 - [7] <https://nucleus.iaea.org/sites/accelerators/Pages/Accelerators4Heritage.aspx>
 - [8] <https://www.iaea.org/online-learning/courses/1499/accelerator-mass-spectrometry-radiocarbon-dating-for-heritage-and-forensic-science>
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Objectives

The main objective of the workshop is to review and discuss recent trends, challenges, novel developments and provide training on radiocarbon Accelerator Mass Spectrometry dating for improved analysis. The aim of this workshop is also to foster interdisciplinary interactions between stakeholders, including museum curators, archaeologists, conservation scientists, natural scientists, environmental scientists, climate scientists, social scientists, etc. as well as physicists, and chemists working at Accelerator Mass Spectrometry facilities for improved knowledge and strategies for preservation of cultural and natural heritage in Latin America.

Expected Outputs

The workshop will improve the participants' knowledge on the fundamentals of radiocarbon AMS dating technique, its applicability, and limitations in various research fields with special focus on the Latin American cultural and natural heritage. Through the presentations and discussions enhanced networking among the Latin American radiocarbon community and its collaborators are expected. Overall, the event will promote exchange of knowledge and experience, foster technology uptake and establish/maintain collaboration among researchers working with various applications of the ^{14}C -AMS technique. The resulting network of international collaborations will lead to a significant increase of the research based on ^{14}C -AMS dating and improved preservation of cultural and natural heritage with a leadership of Latin American scientists.

Target Audience

The workshop is intended both for early career and senior scientists, actively involved or who would benefit from incorporating ^{14}C -AMS analyses into their research. It is expected that AMS radiocarbon dating specialists will take part together with end-users spanning the fields of earth, natural, environmental, climate, heritage, forensic and social sciences.

Applications from women are especially encouraged.

Working Language

The official language of the workshop is English.

Meeting Structure

The meeting is an in-person meeting only and will be held on multiple locations. The lectures and poster presentations will take place in the auditorium of the Fluminense Federal University. Demonstrations and hands-on activities will be held at the Radiocarbon Laboratory, including the sample preparation laboratory and the Accelerator Mass Spectrometry facility.

The event will be structured around lectures, working group discussions, a poster session, demonstrations, and hands-on activities. A dedicated session to exchange ideas, share experiences, and express recommendations will be organized at the end of the workshop.

It is expected that the workshop will start at 9 a.m. on the 4th of November 2024 and finish by 4 p.m. on the 8th of November 2024.

Topics

The workshop aims at tackling the following key topics:

- Fundamentals of ^{14}C -AMS;
- Latin American cultural and natural heritage;
- Preservation of pre-Columbian and historical cultural heritage;
- Fossil carbon input in the natural environment and sustainability;
- Authentication, fraud and illegal trade detection;
- Best practice of sample handling for ^{14}C -AMS;
- ^{14}C -AMS-based biogenic fraction determination methodologies;
- Calibration of radiocarbon dates; uncertainties;
- Modeling ^{14}C in open systems;
- Databases and open science approaches;
- Best practices and ethics for ^{14}C -AMS facilities;
- Latin American radiocarbon network initiative.

Participation and Registration

There is no registration fee. All persons wishing to participate in the workshop have to be designated by an IAEA Member State or should be members of organizations that have been invited to attend.

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 **10 July 2024**. 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 the above deadline.

It is **compulsory to submit an abstract** for an oral or poster presentation alongside the participation forms (Form A and Form B) as part of the application. The abstract must be in the working language of the workshop, a maximum of 500 words long, and be related to the topics of the workshop. Abstracts may contain a maximum of one figure and/or one graph and have to be sent in PDF format.

In total 50 participants are expected to attend the workshop. The participants are expected to be professionals in the target research fields and with a position of leadership or coordination of a research group. Exceptions can be expected, especially in cases when there are no applicants in a group leader position for any of the topics of the workshop. The selection committee aims to balance the expertise of the participants based on the topics of the workshop.

Absolute priority will be given to applicants affiliated with institutions located in Latin America and the Caribbean.

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 completing logistical arrangements where required.

Notification of acceptance and any other relevant communication will be done electronically through the e-mail addresses of the applicants.

IAEA Participation

Nominations will be considered only, if the **Participation Form A, an abstract and Form B** are transmitted to the IAEA through the appropriate Governmental representative authority (e.g. Ministry of Foreign Affairs, National Atomic Energy Authority) by **10 July 2024**.

Expenditures and Grants

No registration fee is charged to the participants.

The IAEA is generally not in a position to bear the travel and other costs of participants in the event. The IAEA has, however, limited funds at its disposal to help meet the cost of attendance of certain participants from Member States eligible to get financial support through the IAEA Technical Cooperation mechanism. Upon specific request, such assistance may be offered to normally one participant per country, provided that, in the IAEA's view, the participant will make an important contribution to the event.

The application for financial support should be made using the **Grant Application Form (Form C)** which has to be stamped, signed, and submitted by the competent national authority to the IAEA together with the **Participation Form (Form A), abstract, and abstract submission Form (Form B)** by **10 July 2024**.

Regular participant	Form A, Form B and abstract
Participant wishes to apply for financial support	Form A, Form B, Form C, and abstract

Visas

Participants who require a visa to enter Brazil should submit the necessary application as soon as possible to the nearest diplomatic or consular representative of Brazil.

Venue and Accommodation

The event will be held at the Physics Institute of Fluminense Federal University, Gragoatá, 24210–346 Niterói/RJ – Brazil (www.portal.if.uff.br).

Participants are responsible for organizing their own travel and accommodation.

There are many hotels nearby the event location (suggested hotels include e.g. Hotel H, Hotel Icaraí, Tower hotel and Hotel Cantareira). More information will be available on the travel logistics, accommodation, and venue on the workshop webpage by the time the invitation letters are sent.

Key Deadlines and Dates

10 July 2024	Deadline for submission of Participation Form (Form A), Submission of a Paper (Form B), abstract and Grant Application Form (Form C) (if applicable) through the official channels
20 August 2024	Invitation letters are sent
15 October 2024	Information on the meeting agenda, are sent to the meeting participants
4 November 2024	Workshop begins
8 November 2024	Workshop ends

Workshop Webpage

Participants are encouraged to visit the workshop web page regularly to check for new or updated information regarding the event:

Workshop webpage: <https://nucleus.iaea.org/sites/accelerators/Pages/cultural-heritage-events.aspx>

Workshop Organizers:

Scientific Secretary

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Tel.: +43 1 2600 21706
Email: Aliz.Simon@iaea.org

Administrative Secretary

Ms Marion Linter

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Department of Nuclear Sciences and
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International Atomic Energy Agency
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Tel.: +43 1 2600 25119
Email: M.Linter@iaea.org

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. For local information please contact the local organizers.

Local Organizers

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Laboratório de Radiocarbono
(LAC-UFF)
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Participation Form

Joint IAEA–Fluminense Federal University Workshop on Radiocarbon Accelerator Mass Spectrometry for Cultural and Natural Heritage Preservation in Latin America

Rio de Janeiro, Brazil

4 to 8 November 2024

To be completed by the participant and sent to the competent national authority (e.g. Ministry of Foreign Affairs, Permanent Mission to the IAEA, or National Atomic Energy Authority) of his/her country for subsequent transmission to the International Atomic Energy Agency (IAEA) either by email to: Official.Mail@iaea.org or by fax to: +43 1 26007 (no hard copies needed). Please also send a copy by email to the Scientific Secretary, Ms Aliz Simon, Division of Physical and Chemical Sciences, Department of Nuclear Sciences and Applications (Email: Aliz.Simon@iaea.org) and to the Administrative Secretary, Ms Marion Linter (Email: M.Linter@iaea.org).

Participants who are members of an invited organization can submit this form to their organization for subsequent transmission to the IAEA.

Deadline for receipt by IAEA through official channels: 10 July 2024

Family name(s): (same as in passport)	First name(s): (same as in passport)	Mr/Ms
Institution:		
Full address:		
Tel. (Fax):		
Email:		
Nationality:	Representing following Member State/non-Member State/entity or invited organization:	
If/as applicable: Do you intend to submit a paper? Yes <input type="checkbox"/> No <input type="checkbox"/> Would you prefer to present your paper as a poster? Yes <input type="checkbox"/> No <input type="checkbox"/> Title:		

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. The IAEA may also use the contact details of Applicants to inform them of the IAEA's scientific and technical publications, or the latest employment opportunities and current open vacancies at the IAEA. These secondary purposes are consistent with the IAEA's mandate.

Form for Submission of a Paper

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Deadline for receipt by IAEA through official channels: 10 July 2024

Title of the paper:		
If applicable: Abstract ID in IAEA-INDICO:		
Family name(s) and first name(s) of all author(s) (same as in passport(s):	Scientific establishment(s) in which the work has been carried out	City/Country
1.		
2.		
3.		
Family name(s) and first name(s) of author presenting the paper (same as in passport):	Mr/Ms:	
Mailing address:		
Tel. (Fax):		

Email:

I plan to attend virtually:

Yes No

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Furthermore, I herewith declare:

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that any permissions and rights to publish required for third-party content, including but not limited to figures and tables, have been obtained, that all published material is correctly referenced; and

that the material submitted to the IAEA does not contain any libellous or other unlawful statements and does not contain any materials that violate any personal or proprietary rights of any person or entity.

Date:

Signature of main author:

Grant Application Form

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Family name(s): (same as in passport)	First name(s): (same as in passport)	Mr/Ms:
Mailing address:	Tel.:	
	Fax:	
	Email:	
Date of birth (yy/mm/dd):	Nationality:	
I plan to attend virtually:	Yes <input type="checkbox"/> No <input type="checkbox"/>	

1. Education (post-secondary):

Name and place of institution	Field of study	Diploma or Degree	Years attended from	to

2. Recent employment record (starting with your present post):

Name and place of employer/ organization	Title of your position	Type of work	Years worked from	to

3. Description of work performed over the last three years:

4. Institute's/Member State's programme in field of event:

Date: _____ **Signature of applicant:** _____
Date: _____ **Name, signature and stamp of Ministry of Foreign Affairs, Permanent Mission to the IAEA or National Atomic Energy Authority** _____