

# IAEA NUCLEAR FORENSICS RESIDENTIAL ASSIGNMENTS

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# IAEA Residential Assignment

**What:** Residential Assignment for Human Capacity Building in Nuclear Forensic Analytical Measurements

**Where:** Host Laboratory with Nuclear Forensics experts

**How long:** Up to 63 working days

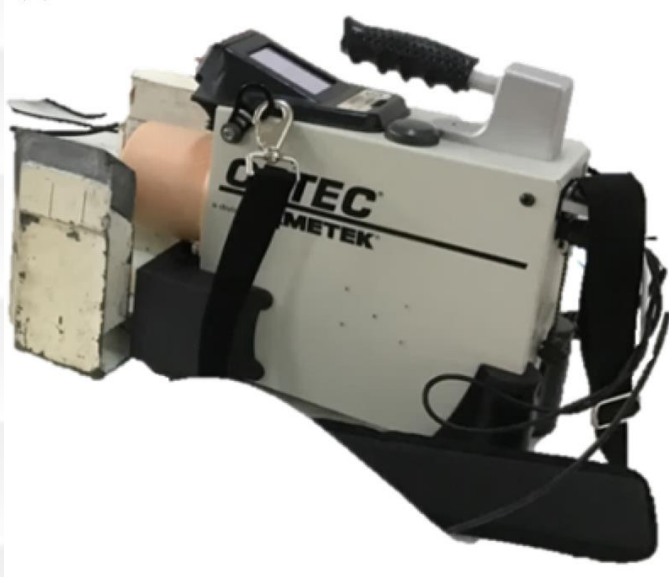
**Who:** Capable, experienced, technical nuclear forensics analysts from engaged countries

**IAEA Residential assignments have thus far been hosted at:**

- Joint Research Center, European Commission
- Hungarian Academy of Sciences Centre for Energy Research
- Lawrence Livermore National Laboratory, California, USA



# IAEA Residential Assignment Models to-date



**Focused Characterization**  
**Effort:** Cf-Sources  
by Gamma Spectrometry



**Team Exercise:**  
Nuclear Forensic  
Examination



**In-Depth**  
**Peer-to-Peer:**  
Radiochronometry

# Residential Assignment at MTA-EK, Hungary

- **Designed as a team exercise**
  - Real Samples
  - Fictitious scenarios
  - 2-month time frame

During the past 4 years nuclear scientists and police officers from Bulgaria, Croatia, Czech Republic, Ghana, Kazakhstan, Kenya, Lebanon, Malaysia, Romania, Slovakia, South-Africa and Thailand (13 total participants) have participated in the program.



# Residential Assignment at MTA-EK, Hungary

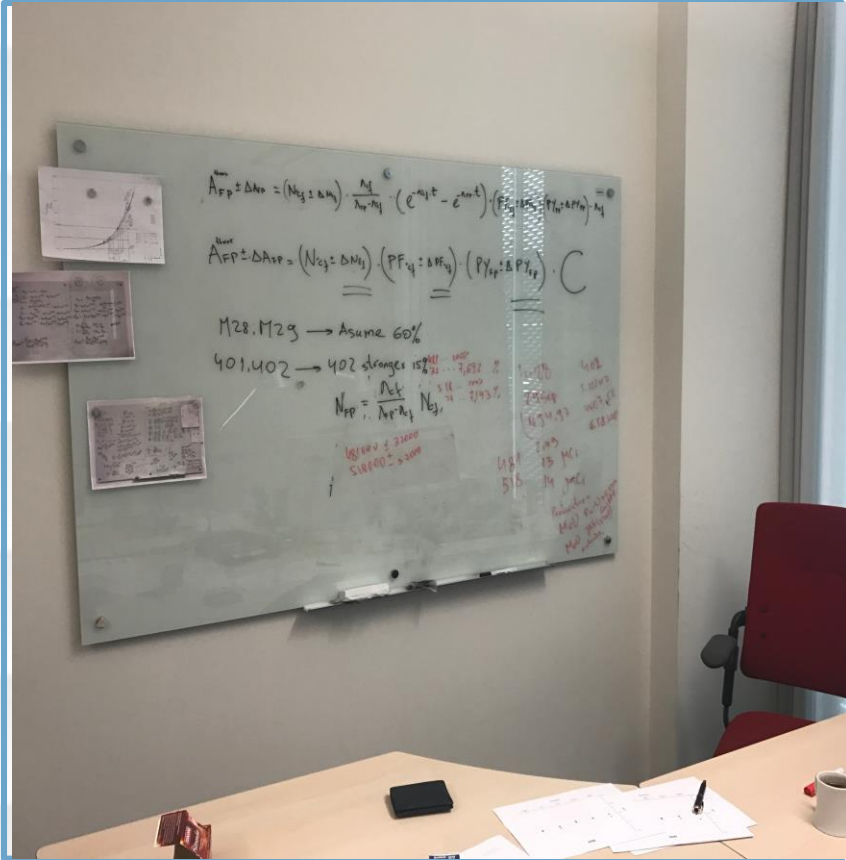
**Main Goal:** Guide participants through a structured team exercise in order to deepen participants' understanding of the nuclear forensic examination process

## Residential Assignment Exercise:

- Radiological crime scene management
- Development of analytical plan
- Laboratory analysis and interpretation
- Exercise use of a National Nuclear Forensics Library (NNFL)



# Residential Assignment at JRC, European Commission



## JRC Residential Assignment in Source Characterization

- JRC hosted RA between September - December 2017
- Resident Scientist, Andrei Apostol, selected from Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering (IFIN-HH), Romania
- Studied Nuclear Forensics Signatures in Californium sources by Gamma Ray Spectrometry and Neutron Counting Techniques

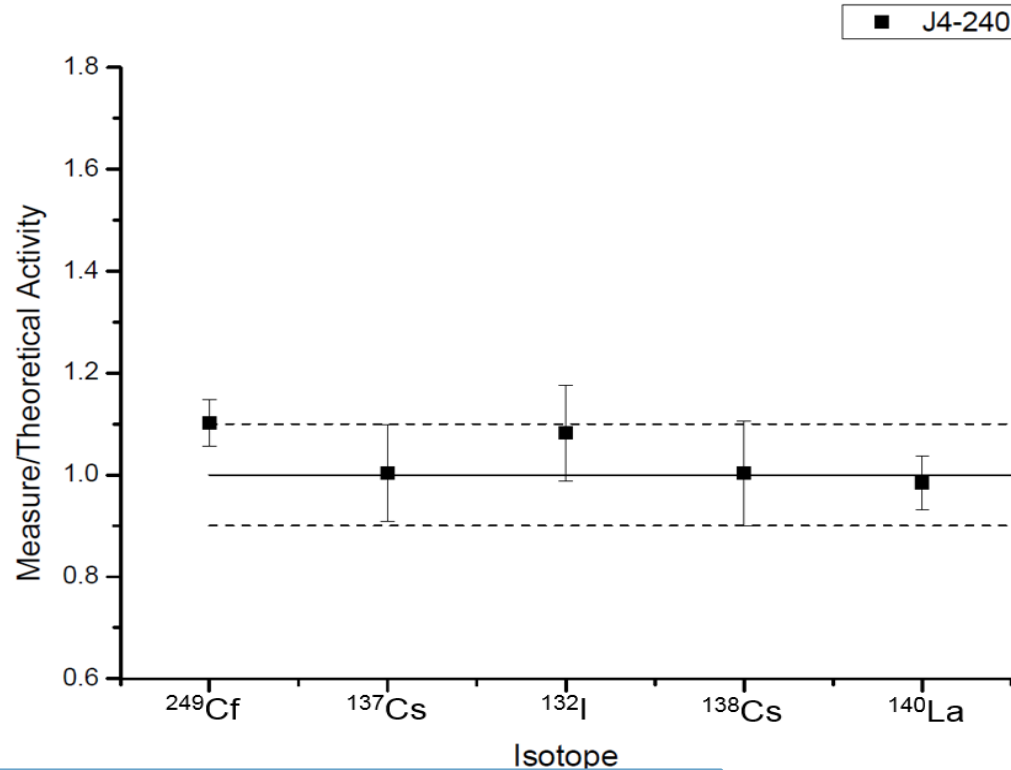
# Residential Assignment at JRC, European Commission

Journal of Radioanalytical and Nuclear Chemistry  
<https://doi.org/10.1007/s10967-019-06628-0>

## Characterization of californium sources by gamma spectrometry: relevance for nuclear forensics

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| Sample ID | Age from declared Cf separation date (y) | Measured                                       | Measured                                       | Measured  | Measured  |
|-----------|--|--|--|---|---|
|           |  | Age (y)<br><sup>137</sup> Cs/ <sup>132</sup> I | Age (y)<br><sup>137</sup> Cs/ <sup>131</sup> I | Age (y)<br><sup>137</sup> Cs/ <sup>140</sup> La | Age (y)<br><sup>137</sup> Cs/ <sup>138</sup> Cs |
| D2-401    | Unknown                                  | 21.7 ± 3.0                                     | -  | 22.1 ± 3.2                                      | 21.9 ± 3.2                                      |
| D2-402    | Unknown                                  | 21.2 ± 2.9                                     | -  | 21.6 ± 2.9                                      | 21.8 ± 2.9                                      |
| M5-028    | 4.12                                     | 4.1 ± 0.3                                      | 4.2 ± 0.3                                      | -   | 4.1 ± 0.3                                       |
| M5-029    | 4.12                                     | 4.2 ± 0.3                                      | 4.1 ± 0.3                                      | -   | 4.2 ± 0.3                                       |
| J4-240    | 6.16                                     | 6.0 ± 0.9                                      | -  | 6.0 ± 0.8                                       | 5.9 ± 0.8                                       |

# Residential Assignment at Lawrence Livermore National Laboratory

## IAEA Residential Assignment in radiochronometry

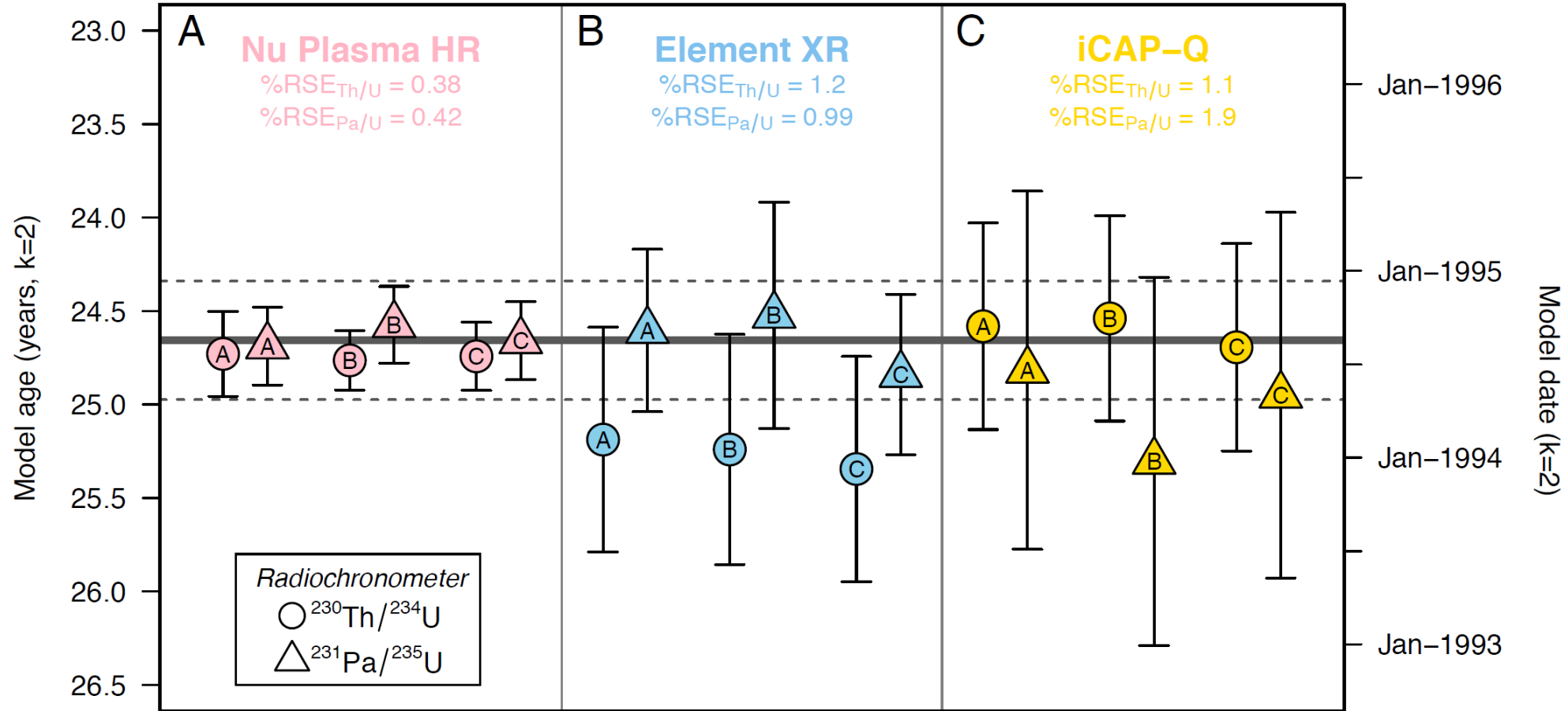
- LLNL hosted RA between September - December 2018
- Resident Scientist, Marta Bavio, selected from CNEA in Argentina
- In support of on-going peer-to-peer engagement in nuclear forensics between Argentina and USA
- Investigated performance of single-collector and multi-collector mass spectrometers for radiochronometry applications





# Residential Assignment Radiochronometry Results

CRM125A U–Th–Pa model age summary



# Results from Residential Assignments

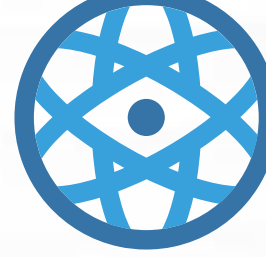
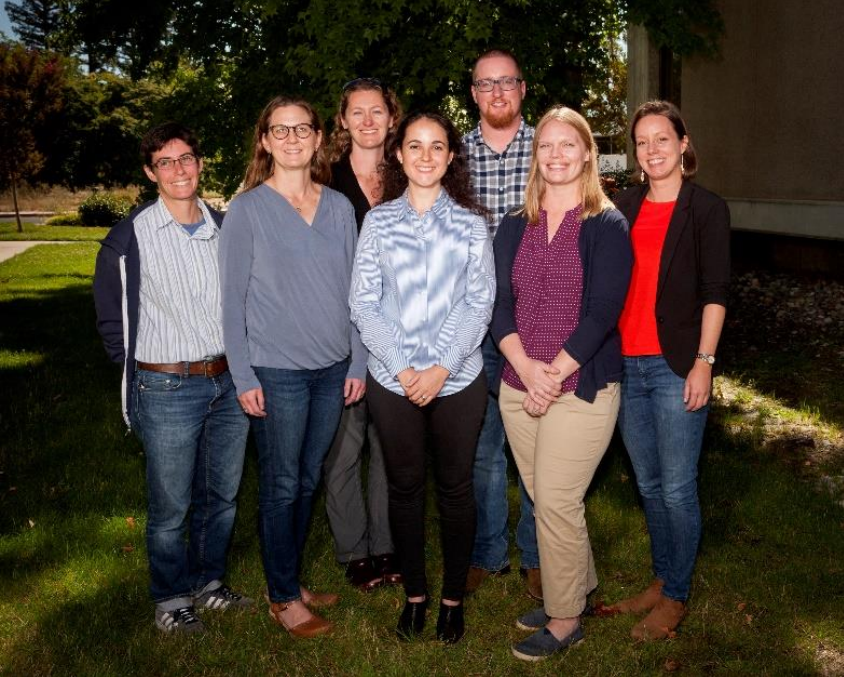


- Mid-term and final reports, presentations, and analytical results
- Important scientific contributions to host institutions
- Gained valuable skills and experience for resident scientist
- Panel discussions, invited talks, and discussions at IAEA
- Results published in open, peer-reviewed scientific literature

# Benefits of Residential Assignments to all parties

- More robust analytical planning and laboratory analysis skills
- Strong peer-to-peer working relationships
- Knowledge transfer from host institution to resident scientist, and in-turn, resident scientist institutions
- Stronger regional nuclear forensic capabilities





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**NUCLEAR FORENSICS**

[www.nuclear-forensics.org](http://www.nuclear-forensics.org)

