

**OAK RIDGE NATIONAL LABORATORY
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**ORNL
FOREIGN TRIP REPORT
TA 401155**

DATE: January 16, 2017

SUBJECT: Report of Foreign Travel Vienna, Austria– Goran Arbanas, Reactor and Nuclear Systems Division

TO: Angela Chambers, Nuclear Criticality Safety Program Manager, National Nuclear Security Administration / NA-511/GTN, 1000 Independence Ave., SW, Washington, DC 20585-1290

FROM: Goran Arbanas

**MEETING:
TITLE** IAEA Consultants’ Meeting on R-Matrix Codes for Charged-particle Induced Reactions in the Resolved Resonance Region

**MEETING:
LOCATION** IAEA Headquarters, Vienna, Austria

**MEETING:
DATES** 12/5/2016 – 12/7/2016

**ATTENDEES:
ON BEHALF
OF NCSP** Goran Arbanas

**MEETING:
BENEFIT TO
NCSP** Goran Arbanas participated in the 2016 International Atomic Energy Agency (IAEA) Consultants’ Meeting on R-Matrix Codes for Charged-particle Induced Reactions in the Resolved Resonance Region, December 5-7, 2016. This meeting provided an opportunity to exchange technical information with experts in R-matrix formalism and codes used in nuclear data evaluations benefiting NCSP nuclear data work efforts. Arbanas’ participation in this Consultants’ Meeting is needed to ensure the NCSP requirements would be met by the modernized version of the SAMMY code.

PURPOSE: Participate in the 2016 Consultants’ Meeting on R-Matrix Codes for Charged-particle Induced Reactions in the Resolved Resonance Region, represent NCSP nuclear data needs and discuss ongoing modernization of the nuclear data evaluation code SAMMY. Furthermore, the purpose of the travel is to cultivate and sustain collaborations with multiple international partners who may help the NCSP accomplish nuclear data work tasks as defined in the FY16-20 NCSP Five Year Plan.

**SITES:
VISITED** Vienna, Austria

ABSTRACT: Arbanas participated in a three-day round-table discussion of various extant or emerging R-matrix codes authored and presented by the participants of this IAEA Consultants' Meeting, where features of various R-matrix codes were compared and contrasted. During the formal presentation session of this meeting on December 6, 2016, Arbanas presented talks titled "SAMMY Modernization", and "Generalized Reich-Moore R-matrix Approximation". The first talk outlined how SAMMY modernization is leveraging modern software development framework used for the SCALE, the ORNL's comprehensive modeling and simulation suite for nuclear safety analysis and design. The second talk described a mathematical perspective from which the soundness of Reich-Moore approximation implemented in the code SAMMY could be easily seen, thus allaying concerns recently raised by some participants. A detailed IAEA Summary Report INDC(NDS)-0726 of this meeting will become publicly available in the near future.

Access to the information in this report is limited to those indicated on the distribution list and to U.S. Government Agencies and their Contractors.

REPORT OF FOREIGN TRAVEL

**Goran Arbanas
Vienna, Austria
December 5-7, 2016**

PURPOSE OF TRAVEL

The purpose of the travel is for Goran Arbanas to participate in the 2016 IAEA Consultants' Meeting on R-matrix Codes for Charged-particle Reactions in the Resolved-Resonance Region and represent NCSP nuclear data needs and discuss ongoing modernization and development of nuclear data evaluation methods in the ORNL's resolved and unresolved resonance range evaluation code SAMMY. Furthermore, the purpose of the travel is to cultivate and sustain collaborations with multiple international partners who help the NCSP accomplish nuclear data work tasks as defined in the FY16-20 NCSP Five Year Plan.

With regard to the benefit of the foreign travel to the NCSP, the IAEA Consultants' Meeting provided an opportunity to exchange technical information with R-matrix experts from across the international nuclear data community and help influence work activities that can benefit NCSP nuclear data work efforts. During the week, Arbanas has presented presentations on SAMMY Modernization and on Generalized Reich-Moore Approximation, and has participated in all technical sessions on R-matrix nuclear data evaluations methods and codes development. Therefore, the direct benefit of the travel is the sustained collaboration with an international community of R-matrix experts to benefit nuclear data evaluations for the NCSP.

More information including the presentations can be found at the meeting website is at <https://www-nds.iaea.org/index-meeting-crp/CM-R-matrix-2016/>. The official report from this meeting can be found at <https://e-reports-ext.llnl.gov/pdf/865554.pdf>.

Itinerary

12/03/16 - 12/04/16	Travel from Knoxville, TN, USA to Vienna, Austria
12/05/16 – 12/07/16	Participate in 2016 IAEA Consultant's Meeting in Vienna, Austria
12/08/16 – 12/10/16	Personal days to visit family in Zagreb, Croatia.
12/11/16	Travel from Vienna, Austria, to Knoxville, TN, USA

APPENDIX A



Consultants' Meeting on

R-Matrix Codes for Charged-Particle Reactions in the Resolved Resonance Region

5-7 December 2016

A24-11, IAEA Headquarters, Vienna, Austria

PROVISIONAL AGENDA

Monday, 5 December

08:30 – 09:00 **Registration (IAEA Registration Desk, Gate 1)**

09:00 – 09:30 **Opening Session**

Welcoming address

Administrative matters

Election of Chairman and Rapporteur

Adoption of the Agenda

09:30 – 17:00 **Presentations by participants**

- 1) Short review of project, goals and current status (P. Dimitriou, IAEA)
- 2) Theory and Tools for R-matrix Fitting (I. Thompson, LLNL)
- 3) R-matrix needs in Nuclear Astrophysics (R. DeBoer, Notre-Dame U.)
- 4) Recent progress of an R-matrix code (S. Kunieda, JAEA)
- 5) A Modern Theoretical Approach to the R-matrix and the coming EDA6 Los Alamos implementation (M. Paris, LANL)
- 6) SAMMY modernization, generalized Reich-Moore approximation and its relevance to unitarity and alternative R-matrix parametrization of Brune (G. Arbanas, ORNL)
- 7) An Adaptive R-Matrix Approach for Light Nuclei (T. Srdinko, TUW)
- 8) Evaluation of $^{17,18}\text{O}(\alpha, n)$ reaction (M. Pigni, ORNL)- Skype connection
- 9) ? (Z. Chen, Tsinghua University)

Coffee break(s) as needed

(12:30 – 13:30 Lunch break)

Tuesday, 6 December

09:00 – 17:30 Round Table Discussion

Coffee break(s) as needed

(12:30 – 14:00 Lunch break)

19:00 Dinner at a local restaurant (see separate information in folder)

Wednesday, 7 December

09:00 – 13:00 Round Table Discussion cont'd - Drafting of the Summary Report

Closing of the Meeting

Coffee break as needed

APPENDIX B

2016 IAEA Consultant's Meeting Photo



DISTRIBUTION

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