**Joint ICTP-IAEA School in collaboration with n\_TOF**

**“Nuclear Data Measurements for Science and Applications”,**

19 - 30 October 2015, ICTP - Miramare, Trieste, Italy

*(smr 2741, web-page:* [*http://indico.ictp.it/event/a14288/*](http://indico.ictp.it/event/a14288/))

**1. The tentative Programme of Lectures and *Practical Exercises*** (*in Italic*):
 Lecturer is expected to give in average 2 lectures (~1.5h each) and probably an Exercise

 Dates of Stay: **black** - requested; green - preferable at the moment; ? - ? - is not specified yet by Lecturer.

| **N** | **Lecturer** | **Affiliation** | **Titles of Lecture or *Practical Exercise*** | **Lecture****duration** | **Code** | **Stay Time** |
| --- | --- | --- | --- | --- | --- | --- |
| 1. 2
 | FrankGunsing  | CERN, Genevagunsing@cea.fr | Introduction to neutron-induced reactions and the R-matrix formalism | 1.5 h | Gun 1 | 29 - 30Oct |
|  | GiuseppeTagliente | INFN, Bari giuseppe.tagliente@ba.infn.it | Neutron data for Nuclear Astrophysics: needs and measurements | 1.5 h | Tag 1 | 18 - 24Oct |
|  | Carlos Guerrero Sanchez | CERN, Geneva;Universidad de Sevilla, carlos.guerrero@cern.ch | Challenging and solutions for radiative capture experiments (theory)*Practice session on capture data analysis (employing ROOT)* | 1.5 h*1.5 h* | Gue 1*Gue 2* | 28 - 29Oct |
|  | Nicola Colonna | INFN-Sezione di Bari, Barinicola.colonna@ba.infn.it | Measurements of neutron-induced fission for fundamental Nuclear Physics and Nuclear Technology | 1.5 h | Col 1 | 19 - 23Oct |
| 1. 5
 | PeterSchillebeeckxJan Heyse | EC-JRC-IRMM, Geelpeter.schillebeeckx@ec.europa.eu EC-JRC-IRMM, GeelJan.HEYSE@ec.europa.eu  | Principles of TOF measurements of total and partial cross sectionsEvaluation of uncertainties and correlations associated with experimental data covariances, least squares fitting.*Hands-on virtual experiments, data taking and pre-analysis of TOF-data using a code based on the AGS-concepts* | 1.5 h1.50 h*1.5 h1.5 h* | Sch 1Sch 2*Sch 3**Sch 4* | 19 - 23Oct |
|  | Hyeong IlKim  | KAERI, Nuclear Data Center, hikim@kaeri.re.kr  | 238U transmission and capture data:  Theory and Exercise | 1.5 h*1.5 h* | Kim 1*Kim 2* | 19 - 23Oct |
|  | Stephan Oberstedt  | EC-JRC-IRMM, Geelstephan.oberstedt@ec.europa.eu | The fission process – How to measure fission fragment propertiesFission-fragment de-excitation: Prompt Neutron and Gamma-ray emission | 1.5 h1.5 h | Ober 1Ober 2 | 26 - 30 Oct |
|  | RalfNolte | PTB, Braunschweig, Ralf.Nolte@ptb.de  | Detection of Neutrons (2 lectures)*Hands-on Exercise "Analysis on neutron flux measurements using different kind of detectors"* | 1.5 h1.5 h*1.5 h* | Nol 1Nol 2*Nol 3* | 19 - 23 Oct |
|  | Xavier Ledoux | GANIL, Franceledoux@ganil.fr  | Delayed neutrons: measurements and usageMeasurements of (n,xn) cross sections | 1.5 h1.5 h | Led 1Led 2 | 19 - 23 Oct |
|  | Viktor Zerkin  | IAEA, Nuclear Data Sectionv.zerkin@iaea.org  | *Experimental (EXFOR) and Evaluated (ENDF) Cross Section Data: retrieving, plotting, processing of XS and covariencies* | *1.5 h**1.5 h* | *Zer 1**Zer 2* | 27 - 30 Oct |
|  | TamasBelgya | KFKI Atomic Energy Research Inst., Budapest,tamas.belgya@energia.mta.hu  | Measurements of Nuclear Data for Prompt-Gamma Activation Analysis*Usage of the PGAA software and database* | 1.5 h*1.5 h* | Bel1 *Bel 2* | 19 - 23Oct |
|  | Yaron Danon | RPI, Troy, NY, USAdanony@rpi.edu  | Lead slowing-down spectrometer.Neutron scattering experiments. | 1.5 h1.5 h | Dan 1Dan 2 | 26 - 30Oct |
|  | Fredrik Tovesson | LANL, USAtovesson@lanl.gov  | Nuclear data measurements at LANL and collaborators | 1.5 h1.5 h | Tov 1Tov 2 | 26 - 30Oct |
|  | Vitaly Khryachkov | IPPE, Obninsk,hva@ippe.ru  | Methods for digital particle spectrometryMeasurements of (n,α) cross sections*Accelerator based monoenergetical neutron sources* | 1.5 h1.5 h1.5 h | Rus 1Rus 2*Rus 3* | 26 - 30Oct |
|  | Florencia Cantargia | Centro Atómico Bariloche & Instituto Balseiro, cantargi@cab.cnea.gov.ar | Fundamental aspects of the thermal neutron scatteringMeasurements of thermal neutron data using a low-intensity pulsed neutron source | 1.5 h1.5 h | Gra 1Gra 2 | 26-30 Oct |
|  | Toshiya Sanami | High energy accelerator research (KEK), toshiya.sanami@kek.jp | DDX measurement for charge particle production reaction by gridded ionization chamber and Bragg Curve Counter at low and intermediate energies | 1.5 + 1.5 h | Jap 1Jap 2 | 19 -30 Oct |
|  | Toshiyuki Shizuma | JAERI, shizuma.toshiyuki@jaea.go.jp  | Photonuclear reaction data measurements and interpretation | 1.5 + 1.5 h | Jap 3Jap 4 | 19 - 23Oct |
|  | David Lhuillier | CEA, Saclay, david.lhuillier@cea.fr | Use of neutrinos while still learning about them (tentative) | 1.5h | Lhu 1 | 26 - 30Oct |
|  | Danas Ridikas | IAEA, Physics Sectiond.ridikas@iaea.org  | Non-energy applications of research reactors | 1.5 h | Rid 1 | 26-30 Oct |

Besides Lectures and Exercises, two **Students' Poster Sessions** are foreseen to facilitate the exchange of knowledge and establishing of social contacts between Lectures and Students.

**Three best Posters** will be awarded by cash prizes and certificates.

**2. The tentative Time Schedule to ascribe Lecturers uniformly to the weeks and to avoid free time slot**

**1st Week: 19 - 23 October (from IAEA - S. Simakov, NDS)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Time** | **Monday19 Oct** | **Tuesday20 Oct** | **Wednesday21 Oct** | **Thursday22 Oct** | **Friday23 Oct** |
| 9:00 - 10:30 | **Opening +Activities at NDS** | **Nol 2** | **Jap 1** | **Jap 3** | **Led 1** |
| Coffee Break 30' |  |  |  |  |  |
| 11:00 - 12:30 | **Col 1** | **Nol 3** | **Jap 2** | **Jap 4** | **Led 2** |
| Lunch Break 1h 30' |  |  |  |  |  |
| 14:00 - 15:30 | **Tag 1** | **Bel 1** | **Sch 1** | ***Sch 3*** | **Kim 1** |
| Coffee Break 30' |  |  |  |  |  |
| 16:00 - 17:30 | **Nol 1** | ***Bel-2*** | **Sch 2** | ***Sch 4*** | **Kim 2** |
| ~18:00 | **Welcome reception-1** | **Poster session -1** |  |  |  |

**2nd Week: 26 - 30 October (from IAEA - D. Ridikas, Physics and V Zerkin, NDS)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Time** | **Monday26 Oct** | **Tuesday27 Oct** | **Wednesday28 Oct** | **Thursday29 Oct** | **Friday30 Oct** |
| 9:00 - 10:30 | **Rid 1** | **Ober 1** | **Tov 1** | **Gue 2** | ***Rus 3*** |
| Coffee Break *30'* |  |  |  |  |  |
| 11:00 - 12:30 | **Gun 1** | **Ober 2** | **Tov 2** | **Rus 1** | **Lhu 1** |
| Lunch Break *1h 30'* |  |  |  |  |  |
| 14:00 - 15:30 | **Dan 1** | **Gra 1** | **Gue 1** | **Rus 2** |  |
| Coffee Break *30'* |  |  |  |  |  |
| 16:00 - 17:30 | **Dan 2** | **Gra 2** | ***Zer 1*** | ***Zer 2*** |  |
| ~18:00 | **Welcome reception-2** | **Poster session -2** |  |  |  |

**3. Topics which will be (or planned to** be**) covered by Lectures and Exercises**

|  |  |  |
| --- | --- | --- |
| **Physics, Nuclear Data, Measurements** | **Experimental Methods** | **Practical Exercises** |
| Reactions producing Mono and White Energy Neutrons | Usage of Accelerator and Reactors for Neutron generation. | *Capture data analysis (employing ROOT)* |
| Thermal neutron scattering | ToF method | *Analysis on neutron flux measurements using different kind of detectors"* |
| Neutron Scattering and (n,xn) experiments | Slowing-down spectroscopy | *Usage of the PGAA software and database* |
| Neutron data for nuclear Astrophysics | Neutron Detectors | *data taking and pre-analysis of TOF-data using a code based on the AGS-concepts* |
| Neutron-induced reactions in the resonance region | Fission and Charged Particles Ionization Chambers | EXFOR and ENDF:*retrieving, plotting, processing of XS and covariencies* |
| Neutron Total, Partial and Capture Cross sections measurements | Mono-energetic and white accelerator-based neutron sources | *Accelerator based monoenergetic neutron sources* |
| Neutron induced Fission experiments | Bragg curve detector |  |
| Prompt Neutron and Gamma-rays from Fission | Measurements of delayed neutrons |  |
| Prompt Gammas from neutron Capture (PGAA) |  |  |
| (n,a) and other Gas production reactions |  |  |
| Neutron and Proton induces Charged light and heavy reaction fragments reactions at low and intermediate energies |  |  |
| Photonuclear reaction data measurements and interpretation |  |  |
| Measurements of the (n,xn) cross sections |  |  |
| Delayed neutrons |  |  |
| Neutrino |  |  |
| Nuclear Physics and Nuclear Data Measurements at LANL |  |  |