

# Report

on

## ADVANCED WORKSHOP ON “THE APPLICATIONS OF NUCLEAR SECURITY: DETECTION EQUIPMENT AND METHODOLOGIES”

Workshop Date: 19<sup>th</sup> – 22<sup>nd</sup> June 2023

Venue: Amity University Uttar Pradesh, Noida Campus, India

Radiation detection systems are the integral part of nuclear security systems to detect and respond to any kind of malicious act like unauthorized access, sabotage, illegal transfer and theft involving nuclear and other radioactive materials. To enhance the capabilities of trained radiation personnels, an advanced level workshop on “THE PRACTICAL APPLICATION OF NUCLEAR SECURITY: DETECTION EQUIPMENT AND METHODOLOGIES”, was organized during 19<sup>th</sup> to 22<sup>nd</sup> June 2023 in collaboration with Texas A&M University (TAMU), Oak Ridge National Laboratory (ORNL) and Defense Threat Reduction Agency (DTRA), US. The workshop was for the participants who have attended the previous workshop on “THE PRACTICAL APPLICATIONS OF NUCLEAR SECURITY”, June, 2022 & March 2023 at Amity University Uttar Pradesh (AUUP), Noida campus, India.

### Workshop Objectives

- ✓ *To impart knowledge of the Nuclear Security Detection and Measurement systems*
- ✓ *To train the trainers on radiation detectors.*
- ✓ *To provide first-hand experience on nuclear safety and security equipment*
- ✓ *Demonstration on remote lab facility.*
- ✓ *Visibility of facility for the future coordination and collaboration.*
- ✓ *Opportunity for Internship/Dissertations/Projects for UG/PG students at AINST*
- ✓ *Opening of the ANSETRF Laboratories for users to use the facility.*
- ✓ *Awareness about the nuclear security education program of AINST.*

The resource persons of the workshop:

- ✓ Faculty members of AINST and AIP, Amity University Uttar Pradesh.
- ✓ Dr. Craig Marianno, Texas A & M University (TAMU), USA
- ✓ Ms Minu Singh, MD, Nuvia India Pvt Ltd, Delhi

### Inauguration of the workshop:

The inaugural ceremony of the Advanced Workshop on “The Applications Of Nuclear Security: Detection Equipment And Methodologies” was commenced on 19<sup>th</sup> June 2023 with the lighting of lamp along with Saraswati-Vandana by a dignitaries from Amity University Uttar Pradesh, Texas A&M university, USA, UGC-DAE-CSR, Variable Energy Cyclotron Centre (VECC), Kolkata, Heritage Institute of Technology (HIT) Kolkata and Inter-University Accelerator Centre, New Delhi.

Prof. Dr. Alpana Goel, Director & Head formally welcomed all the dignitaries present on the dais and participants. She also thanked Texas A&M University (TAMU), Oak Ridge National Laboratory (ORNL) and Defense Threat Reduction Agency (DTRA), US for supporting to organize the workshop.

Dr. Craig Marianno, Deputy Director Center for Nuclear Security Science and Policy Initiatives mentioned about the significance of radiation detectors for strengthening nuclear security and objectives of the workshop.

Dr W Selvamurthy, President, Amity Science, Technology and Innovation Foundation also shared his thoughts about the advanced workshop.

Keynote speaker of the workshop was Dr. A.K. Sinha, Former Director, UGC DAE-CSR. Dr. Sinha delivered keynote address on the advancement in the technologies in nuclear detection and other associated fields which will bring in better approaches and strategies to handle any potential mishap associated with nuclear radiation.

After the formal inaugural, a panel discussion was conducted on the Theme: Emerging Technology in Nuclear Safety and Security. The session was chaired by Dr. R. K. Bhandari, (Ex-Director) VECC.

The following speakers were present precipitated during panel discussion session

1. Dr. Debabrata Datta, Professor & Joint Director, Research & Development, Heritage Institute of Technology, Kolkata; Former Nuclear Scientist & Head, Radiological Physics & Advisory Division, Bhabha Atomic Research Centre, Mumbai
2. Dr. R. P. Singh, Scientist H, Inter-University Accelerator Center, New Delhi-110067.
3. Dr. Pawan Kuleriya, Associate Professor, School of Physical Sciences, Jawaharlal Nehru University New Delhi.
4. Dr. Kaushik Banerjee, Scientific Officer G, Variable Energy Cyclotron Centre, Kolkata.
5. Prof A. K. Jain, Advisor, AINST, AUUP

At the end of inaugural session, book titled “The unreasoned fear of radiation” was released by one of the author Dr. Samyak S Munot, BARC, DAE along with the dignitaries present during the inaugural session.

During the technical session of the 4 days advanced workshop, following lecture was delivered

- Introduction to Radiation Interaction
- Radiation Detectors & Detection Mechanisms -1
- Introduction to Software Related to Radiation Detectors
- Introduction to Nuclear Security Culture
- Radiation Detectors and Detection Mechanisms -2
- Security Sensors/Portal Monitors Working & Limitations
- Nuclear Contamination and Formulations for Decontamination and De-corporation.

Participates also performed following list of experiments

- a) Calibration of radiation detectors [NaI(Tl), CeBr<sub>3</sub> and HPGe]
- b) Comparison of efficiency & resolution of various detectors for gamma ray spectroscopy.
- c) Compton scattering experiment.
- d) Effectiveness of shielding materials to attenuate gamma radiations: Determination of HVT/TVT (using GM)
- e) Sensitivity analysis of portal monitors (speed of movement, height/depth of source container)

Apart from the lectures and lab demonstration, case studies on nuclear security culture and table-top exercise on RIID were conducted.

In the last day of the workshop, a start of art remote laboratory facility was also demonstrated for the participants

3<sup>rd</sup> Day of the workshop, a special session on Women in Engineering was conducted by Ms Minu Singh MD, Nuvia India Pvt Ltd

Concluding of the workshop was on 22<sup>nd</sup> June 2023, where the participants shared their views regarding the workshop. Later on a Google form was circulated among the participants, and they provided their feedback. After that speakers were felicitated and finally certificates along with gift were distributed among the participants of the workshop. At the end, concluding speech was delivered by Prof. Alpana Goel and Craig Marianno

Expected Outcomes of the workshop are:-

- Knowledge of the Nuclear Security Detection and Measurement systems was imparted to the participants
- The Trainers on radiation detectors was trained
- First-hand experience on nuclear safety and security equipment was provided
- Remote lab facility was demonstrated.
- Visibility of facility for the future coordination and collaboration.
- Opportunity for Internship/Dissertations/Projects for UG/PG students at AINST
- Possibility of utilization of ANSETRF Laboratories for users to use the facility.
- Awareness about the nuclear security education program of AINST was created

### Program Schedule

**DAY 1 (19 June, 2023)**

**Venue: F3 MDP Hall**

TIME	AGENDA ITEM/ ACTIVITY	Proposed Implementer
12:30-14:00	Working lunch & Registration	F3 Foyer, Amity University
14:00-14:02	Lighting of the Lamp	All Dignitaries
14:02 – 14:10	Welcome Address	Prof. (Dr.) Alpana Goel Director and Head, AINST
14:10-14:20	Workshop Objectives	Dr. Craig Marianno Deputy Director Center for Nuclear Security Science and Policy Initiatives, TAMU
14:20-14:30	Address	Dr W Selvamurthy President, Amity Science, Technology and Innovation Foundation
14:30: 14:40	Special address by	Prof (Dr) Balvinder Shukla Vice Chancellor Amity University Uttar Pradesh
14:40-14:50	Words of wisdom	Dr. Atul Chauhan (TBC) Chancellor, Amity University Uttar Pradesh President RBEF
14:50-15:00	Blessings & Way forward	Dr. Ashok K. Chauhan

		Founder President, RBEF, Amity University (TBC)
15:00 – 15:30	Keynote Address	Dr. A.K. Sinha Former Director, UGC DAE CSR, Indore
15:30-15:45	High Tea/Coffee	
15:45-17:30	Panel Discussion Theme: Emerging Technology in Nuclear Safety and Security Moderator: Dr. R. K. Bhandari, (Ex-Director) VECC (Moderator)	Dr. D. Datta, HIT Dr. R. P. Singh IUAC Dr. Pawan Kuleriya, JNU Dr. Kaushik Banerjee, VECC Prof A. K. Jain, Advisor, AINST, AUUP
17:30-18:00	Release of Book titled “The unreasoned fear of radiation” and Felicitation of the authors	Dr. Samyak S Munot, HBNI, DAE
18:00-18:30	Proposal Presentations on Nuclear Detectors Research Laboratory	
18:30	Vote of Thanks	Ms. Archana Yadav
19:00 onwards	Workshop Dinner	

**DAY 2 (20 June 2023); Venue: B block, G06**

TIME	AGENDA ITEM/ ACTIVITY	Proposed Implementer
9:25-9:30	Opening Remarks	Dr Arpita Datta
9:30-9:35	Participants Introduction	
9:35 – 10:25	Introduction to Radiation Interaction	Dr. Craig Marianno
10:25 - 11:05	Radiation Detectors & Detection Mechanisms -1	Dr Sudatta Ray
11:05- 11:15	Tea Break	
11:15 – 12:00	Introduction to Software Related to Radiation Detectors	Dr. Sutanu Bhattacharya
12:00 – 13:00	Exercise: Calibration of Radiation Detectors in the Laboratory (All Four Groups)	Ms. Archana Yadav+team
13:00 -14:00	Lunch	
14:00 – 15:00	Exercise: Calibration of Radiation Detectors in the Laboratory (All Four Groups)	Ms. Archana Yadav+ team
15:00- 16:00	Introduction to Nuclear Security Culture	Dr Alpana Goel
16:00 – 16:15	Tea Break	
16:15-17:15	Case study on Nuclear Security Culture	Dr Alpana Goel
17:15	Day 2 Closing Remarks	Dr Arpita Datta

**DAY 3 (21 June, 2023); Venue: B block, G06**

TIME	AGENDA ITEM/ ACTIVITY	Proposed Implementer
9:30 – 9:35	Opening Remarks	Dr Arpita Datta
9:35 -10:15	Radiation Detectors and Detection Mechanisms -2	Dr. Unnati Gupta
10:15 -10:30	Working Tea	
10:30 – 12:00	Security Sensors/Portal Monitors Working & Limitations	Dr Craig Marianno +AINST

12:00 - 13:00	Tabletop Exercise-RIID	Dr Alpana Goel/Archana Yadav
13:00-14:00	Lunch	
14:00-15:30	Comparison Of Efficiency & Resolution of Various Detectors for Gamma Ray Spectroscopy (All Four Groups)	Dr Arpita Datta+Team
15:30 – 15:45	Connecting Tea	
15:45-16:30	Nuclear Contamination and Formulations for Decontamination and De-corporation	Dr. Navneet Sharma
16:30-17:00	Women in Engineering	Ms Minu Singh MD, Nuvia India Pvt Ltd Delhi
17:00	Closing Remarks	

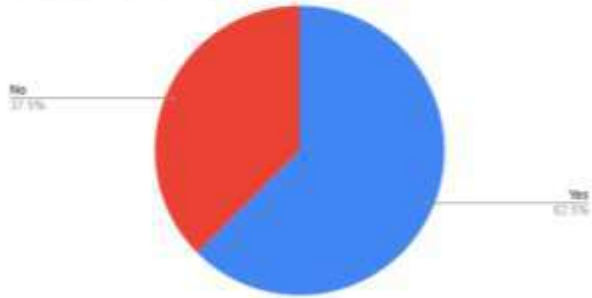
**DAY 4 (22 June, 2023); Venue: B block, G06**

TIME	AGENDA ITEM/ ACTIVITY	Proposed Implementer
9:00 – 9:05	Opening Remarks	Dr Arpita Datta
9:05– 10:45	Effectiveness of Shielding Materials to Attenuate Gamma Radiations: Determination of HVT/TVT (All Four Groups)	Dr Unnati Gupta +Team
10:45-11:00	Tea	
11:00 – 12:00	□-Detection using Alpha- Analysts and Portal Monitor (Two groups on alpha detection setup +one group for portal monitor)	<b>Dr Sudatta Ray+Team</b>
12:00-13:00	Introduction and Demonstration to Remote Laboratory Facility	<b>Dr. Craig Marianno/ Dr Sutanu Bhattacharya</b>
13:00 - 13:30	Felicitation, feedback and closing remarks	Dr Alpana Goel/ Dr. Craig Marianno/DTRA/ORNL
13:30	Lunch	

**Feedback Analysis**



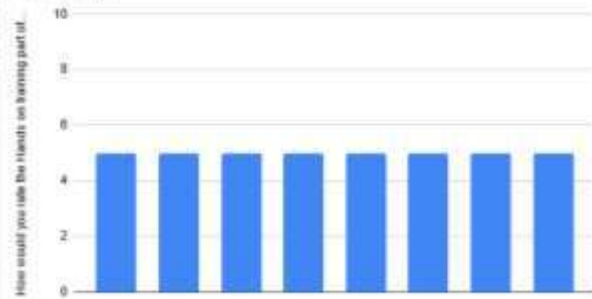
Have you ever used and seen the NaI(Tl), CoBr, HPGe used in the practical training?



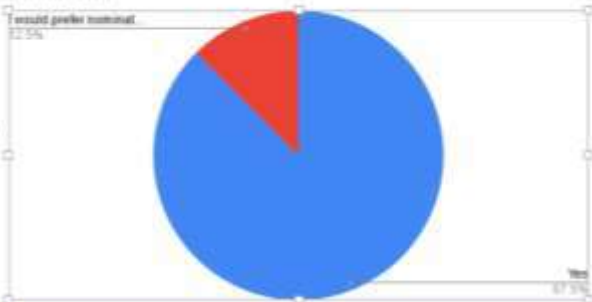
The practical training give you a feel of issues related to nuclear security?

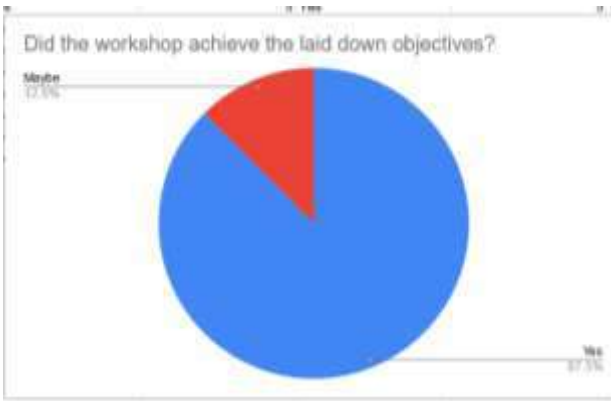
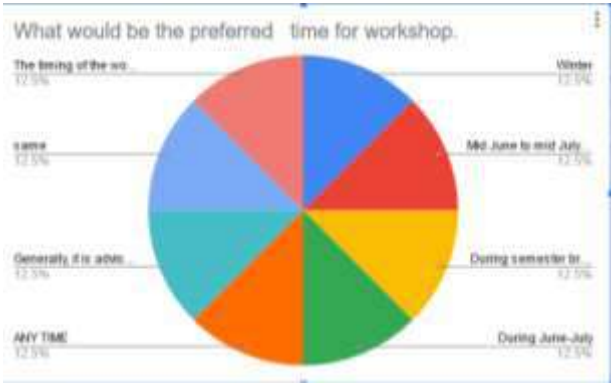


How would you rate the Hands on training part of the workshop?



Would you be interested in participation in such upcoming workshops?





**Glimpses of the workshop:**

