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EDITORIAL

Dear readers,

We are delighted to present the first issue of Atom Indonesia, Volume 51 No. 1 (2025), featuring ten articles that highlight the advancements and applications of nuclear science and technology. These contributions come from a diverse group of authors representing both national and international institutions, emphasizing the global importance and collaborative nature of nuclear research.

The first article "**Thermal Properties of Alpha Decay in Magnetic Field Medium**", analytically studies the thermodynamic properties of alpha decay in a magnetic field using the JWKB method. The study reveals that magnetic fields can influence both the decay rate and associated thermodynamic properties, such as entropy and internal energy. These findings provide insights into the impact of environmental conditions on quantum decay behavior and may enhance our understanding of nuclear stability under various field conditions.

Continuing on detector assessment, the second article, "**Source Identification Performance of Plastic Scintillator Ranging from 100–1300 keV: Assessment Through Monte Carlo Code and Experimental Validation**," explores the performance of a plastic scintillator detector through simulation and experimental comparison. Using MCNP with Gaussian Energy Broadening (GEB), the study validates the detector response for various gamma energy range. Results demonstrate a strong correlation between simulated and measured data, confirming the Monte Carlo model's accuracy and reliability.

The third article with title "**Radiation Dose and Image Quality of Bladder Cancer Patients Analysis on Abdominal CT-Scan Examinations**" evaluates radiation doses and image quality in bladder cancer screening. Analyzing 2,653 CT images from 20 cancer patients, the study compares output from CTDIvol with SSDE values and assesses image quality using SNR and CNR parameters. Findings indicate that while radiation doses exceeded equipment output, the resulting image quality remained sufficient for clinical diagnostics.

Next article on "**Radial Sensitivity of the Nuclear Shell Structure at N=92**" examines nuclear ground-state properties in Sm isotopes using an enhanced mass model. The analysis addresses volume and surface contributions to asymmetry energy and compares predictions with experimental data and established theoretical models such as the Relativistic-Continuum-Hartree-Bogoliubov (RCHB) and the Finite Range Droplet Model (FRDM). Anomalies at specific neutron numbers are observed in magic isotopes (N=82, N=126), as well as in N=92, 136, and 144 within the isotopic series of the "Sm" element.

Article on "**Brain Tumor Segmentation on MRI and CT Images Using Fuzzy C-Means and Active Contour Methods**" two segmentation techniques are applied to MRI and CT brain tumor images. Using MATLAB, results are evaluated based on ROC parameters like accuracy, dice score, precision, and sensitivity. The study finds that Active Contour outperforms Fuzzy C-Means, especially for MRI images, providing enhanced accuracy for clinical use with conclusion, the segmentation results from the Active Contour method can be used as additional information for doctors in diagnosing the presence of tumors.

Next, the sixth article, "**Determination of Typical Values for Pediatric Head CT Scan at Universitas Andalas Hospital,"** seeks to determine reference dose values for pediatric patients. The study examines data from 33 patients and analyzes how age, body mass, and exposure factors (mAs) affect CTDIvol and DLP values. It establishes a typical value of 31.1 mGy for CTDIvol and 793.3 mGy.cm for DLP, while showing strong correlations with patient parameters. This research provides useful reference values that can guide dose optimization in pediatric imaging to ensure radiation safety.

Additionally, an investigation into "**Customization of Source Term into JRODOS Compatible XML File Format Using Visual Basic for Nuclear Accident Analysis**" introduces a Visual Basic tool to convert source term data into XML format for use in the JRODOS platform. Tested on Fukushima scenario data, the code successfully streamlines the data conversion process for complex accident analysis. This tool improves workflow efficiency and enhances accuracy in emergency response simulations.

The issue on a preliminary study was also featured in the article on "**Heavy Metal Waste Using Ch/AgNPs Synthesized by Gamma Radiolysis: Preliminary Study**" researchers synthesize silver nanoparticles stabilized with chitosan using gamma irradiation to detect heavy metal waste. The AgNPs showed peak absorption between 390–500 nm, with 15 kGy identified as the optimal radiation dose for synthesis. The material demonstrated good sensitivity to chromium and mercury, but not to copper and lead. These results offer a fast, sensitive, and efficient method for preliminary heavy metal detection in environmental samples

The ninth article, "**Preliminary Neutronic Studies on RSG-GAS Fuel Element with 4.8 grU/cc and Burnable Poison Wire for Reactivity Reduction**," evaluates the use of high-density fuel in Indonesia's RSG-GAS research reactor. The study explores configurations of cadmium and hafnium burnable poison wires to manage excess reactivity resulting from the higher uranium density. Results indicate that appropriate poison wire designs can suppress reactivity of the fuel assembly longer, while improving neutron economy and extending reactor cycles. The findings provide critical insights for potential fuel conversion scenarios in research reactor operation.

The last article on "**Selection of Bacteria from Mamuju's NORM as 4 Uranium and Thorium Bioleaching Agents**." investigates the potential of native bacteria from NORM sites for use in bioleaching. Eight strains were isolated and tested, with Bacillus sp. L0A showing the highest leaching efficiency for uranium and thorium. This work highlights a sustainable, eco-friendly alternative for extracting valuable elements from naturally occurring radioactive materials.

Each article reflects significant contributions to nuclear science applications, including reactor safety, radiation protection, and environmental monitoring. On behalf of Atom Indonesia, I would like to thank you all for your contributions and endless support that have enabled Atom Indonesia to achieve an outstanding performance over all the years. This outstanding performance could not have been achieved without the great efforts and cooperation of the editors, reviewers, management personnel, authors, and readers. Enjoy reading.

Editor in Chief