# Response to Reviewers’ Comments

**SCOPE**

**Paper ID: #23100**

**Title:** Experience with Delayed- and Prompt-Gamma Neutron Activation Analysis using Accelerator-based neutrons at KFUPM: An overview

**Dear Editor,**

* I want to start by expressing my gratitude to you and the reviewers for your insightful comments. I did my utmost to implement the necessary adjustments.
* Please note that Table 3 is too wide to fit in a single column, therefore it was moved to the end of the paper and extends over two columns.

# Reviewer: 1

## Comment 1

## An Abstract should comprise the following: background, statement of the problem, aim or purpose of the paper.

## Answer 1

**The abstract has been revised and the suggestions raised by the reviewer were considered.**

## Comment 2

## Introduction is short and needs more information such how this paper will be important for nuclear power Engineering

## Answer 2

**The introduction section has been updated to accommodate all the suggestions by both reviewers.**

# Reviewer: 2

## Comment 1

## Introduction section

## - "The process of neutron activation can be achieved with a variety of neutrons." I suggest adding the word "sources" right after "variety of neutrons.".

## Answer 1

**The word “variety” is replaced by “sources” as suggested.**

## Comment 2

## They then de-excite by either instantly emitting one or more prompt gamma rays, or decay by emitting one or more delayed gamma rays with typical half-lives.". Both gamma rays are emitted instantly, however, the prompt gamma rays are emitted in the order of picoseconds while the delayed gamma rays are in microseconds. I suggest the author mention the time in the context "picosecond and microsecond".

## Answer 2

**The second part of the introduction describing the generation of prompt and delayed gamma rays from neutron activations was completely rewritten to remove any ambiguity or misunderstanding. New references [5,6] were provided for this purpose.**

## Comment 3

## (II.A.2. Thermalization of fast neutrons)

## - "A drawing of a typical setup for Neutron Activation using Thermal Neutron Capture (TNC) with neutrons from the 350 keV ion accelerator.". Did you intend to refer to Fig. 1? If yes, kindly put it here as this sentence seems out of context.

## Answer 3

## A new statement was added to cite Fig.1: ((These neutrons were thermalized using a thick moderator as illustrated in Fig. 1)).

## Comment 4

## Figure 1 should be provided in high quality.

## Answer 4

**A new version of Figure 1 is provided with better contrast.**

## Comment 5

## (II.A.4. Applications)

## - In Table 1, there are variations in the digits. It is recommended to have the same number of digits (for example #.00, #.000, or #.0000 and so on) I believe that this comment needs to be considered throughout the paper.

## Answer 5

**The numbers in all tables were revised and significant figures were considered.**

## Comment 6

(II.B. Prompt-Gamma NAA (PGNAA))

- "Another important, if not essential, component for the efficient use of PGNAA are the Monte Carlo simulation codes that are used to optimize the setups, most notably MCNP [13] and Geant4 [14].". I couldn't see how these two MC codes were used in the KFUP NAA studies/ experience. I suggest removing them or providing supporting publications.

## Answer 6

**The reference to Geant4 was removed as requested by the reviewer. A new statement was added to provide evidence for using MCNP code for the KFUPM setups: ((Another important, if not essential, component for the efficient use of PGNAA are the Monte Carlo simulation codes that are used to optimize the setups, most notably MCNP [16-19])).**

## Comment 7

(II.B.1 Applications)

- "PGNAA has been extensively used at KFUPM for the detection and measurement of a large number of elements, ... ". The technique is supplementary and useful for light elements. Therefore, I suggest to mention that.  
**Answer 7**

**A new statement was added to clarify the possibility of using NAA technique to detect elements: ((The technique is useful for the measurement of major concentrations of most elements, including few light elements such as carbon, and oxygen)).**