

# GAMMA SPECTROMETRY WITH NON-LINEAR LEAST-SQUARES FULL-SPECTRUM FITTING – FUNDAMENTALS AND NEW DEVELOPMENTS

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A recent and different method of gamma spectrometry that uses non-linear least-squares fitting to analyze each gamma spectrum as a single, self-consistent set of data will be described. In the initial presentation, the mathematical fundamentals of non-linear least-squares fitting, as applied to analysis of gamma spectra, will be discussed. Live demonstrations of the use of this method, as applied to several challenging spectra, will follow. Free introductory software will be provided so that participants can gain experience with non-linear least-squares analysis of the example spectra with their own computers during the second session. Participants will also be introduced to advanced methods that include full multi-path Bateman solutions and generation of simulated spectra, and will be led through examples that use these advanced features.

- **Sponsoring organization:** Snakedance Scientific, LLC
- **Statement of goals:** To convey an understanding of -- and to provide experience in using -- a new and different method of gamma-ray spectrometry that uses a non-linear least-squares fitting to analyze each gamma spectrum as a single, self-consistent set of data.
- **Will the workshop be technical or commercial in nature:** Commercial. Although we will concentrate on the mathematical fundamentals of least-squares fitting and practical analytical methods of example spectra with free software, an extended implementation of the software is commercially available.
- **Requested duration of the workshop:** Two sessions are planned. In the first session the fundamentals of least-squares fitting with gamma spectrometry will be discussed, and several live demonstrations of the use of this method will be demonstrated. In the second session participants will be led through analysis of example spectra on their own computers, and advanced applications and new developments will be demonstrated. Up to 2 hours for each of the 2 sessions would be ideal, but shorter periods can be accommodated. (NOTE: Dave DiPrete, Dave Saunders, Tom Rucker, and Bob Shannon participated in previous RRMC workshops on the same general topic and can support the desirability of this workshop and its two sessions.)
- **Explanation of plans for workshop proceedings or tutorial handouts:** A true workshop is planned. Live demonstrations of the use of the method non-linear least-squares analysis of challenging real-life spectra are planned for both workshop sessions. Participants will be given a free introductory copy of the software, as well as reference material in PDF format describing analysis of the examples in step-by-step detail. Participants will be encouraged to bring their own laptops to the second session so they can follow along with the examples and ask questions to enhance learning and understanding. Whether or not participants are able to bring a laptop to the workshop, they will be able to follow the examples later with the free software and PDF material that will be provided to them.