

1162-62-5

**Hanna Makaruk\*** ([hanna\\_m@lanl.gov](mailto:hanna_m@lanl.gov)). *Inverse Problem of Experimental Data Analysis*. Preliminary report.

Astronomical observations, unusual medical cases, physics experiments too costly to repeat – all of them produce important information not achievable in other way. They should not be treated as qualitative, anecdotal evidence only. They should be analyzed in a mathematically rigorous way as inverse problems of a one-of-a-kind event to produce quantitative experimental data. Methods for analysis of data from one-of-a-kind event are needed, since this analysis differs in important ways from analysis of repeated experiments' data. For repeated experiments the experimental error includes a range of true values generated by repetitions of the experiment, and measurement uncertainty caused by detectors. They are always independent. Repetitions of any experiment, as similar as achievable, always have built-in differences resulting in a range of the true values rather than in a single value. Measurement uncertainty depends on the measurement system only. Digital measurements have very small uncertainty, frequently smaller than the range of true experimental values resulting from built-in differences in the experiment repetitions. When data from one-of-a-kind experiment are analyzed, only the measurement uncertainty can be reported. (Received August 17, 2020)