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Abstract for an Invited Paper
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On valid interpretation of experimental data: Low temperature plasma diagnostics[1]

PETR BLEK, Masaryk University

This contribution addresses an important, yet sometimes overlooked, aspect of simulation/experiment benchmarking the uncertainty caused by the interpretation of the measurement. While it is common to include error bars on measured data, these error bars typically consider only the uncertainty caused by the instrumental errors. But few diagnostic techniques are direct observations of the quantity in question and most of them rely on an analytical model for transforming the measured signal to macroscopic plasma parameters. The most common quantity used for low temperature plasma diagnostics is probably spectrally resolved light intensity. These spectral measurements are then transformed into macroscopic plasma properties (electric field, concentrations, etc) using various models. While the measured signal is already encumbered by aleatoric and epistemic uncertainty, the applied transformation brings a new sort of uncertainty connected with the uncertainty of constants entering the model that was used for the transformation. We illustrate, on a practical example, how to perform the transformation properly, accounting for the uncertainty of all the constants, and how these uncertainties manifest into the macroscopic plasma properties.

In collaboration with: Adam Obrusník, Masaryk University, PlasmaSolve Company; Zdeněk Bonaventura, Masaryk University

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