JOHANNES KEPLER
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*Im Rahmen des Institutsseminars*

# Besprechung neuerer Arbeiten aus Angewandter Physik (LVA Nr. 374.008)

*spricht*

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# Self-absorption in Optical Emission Spectroscopy

Whenever light is emitted from a source, it has to travel from the interior of the source to the outside. During this passage the photon may come in contact with the same king of atoms or molecules it has been emitted from. These particles have the same transition states and may therefore reabsorb the photon. [1]

This phenomenon is called self-absorption. It can lead to diminished emission lines and in extreme cases even to the phenomena of self-reversal. This can negatively impact accuracy and reliability of quantitative and qualitative measurements and can even falsify results if not taken into account properly. [2]

The talk consists of two part. First, the aim is to describe the phenomena of self-absorption and other relevant topics like line broadening for a better understanding of the topic.

Finally, a novel analytical method which incorporates self-reversal of emission lines to determine isotope ratios will be introduced. Laser Induced Breakdown self-Reversal Isotopic Spectrometry (LIBRIS) exploits the fact that the spectral width of the absorption dip of self-reversed resonance lines is smaller than the width of the emission line profile. This allows to determine the isotopic ratio of lithium, a feat which was not possible with other, established alternatives like Laser Ablation Molecular Isotopic Spectrometry (LAMIS). [3]

[1] R.D. Cowan, G. H. Dieke, "Self-Absorption of Spectrum Lines", Reviews of Modern Physics, Volume 20 (1948)

[2] Reinhard Noll, "Laser-Induced Breakdown Spectroscopy", Springer Verlag Berlin Heidelberg, 2012

[3] Kévin Touchet, Frédéric Chartier, Jörg Hermann, Jean-Baptiste Sirven, “Laser-induced breakdown self-reversal isotopic spectrometry for isotopic analysis of lithium”, Spectrochimica Acta Part B: Atomic Spectroscopy 168 (2020), doi:10.1016/j.sab.2020.105868

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