FP 16

The University Of Sheffield.

# Systematic Study of Background Subtraction Techniques for EELS

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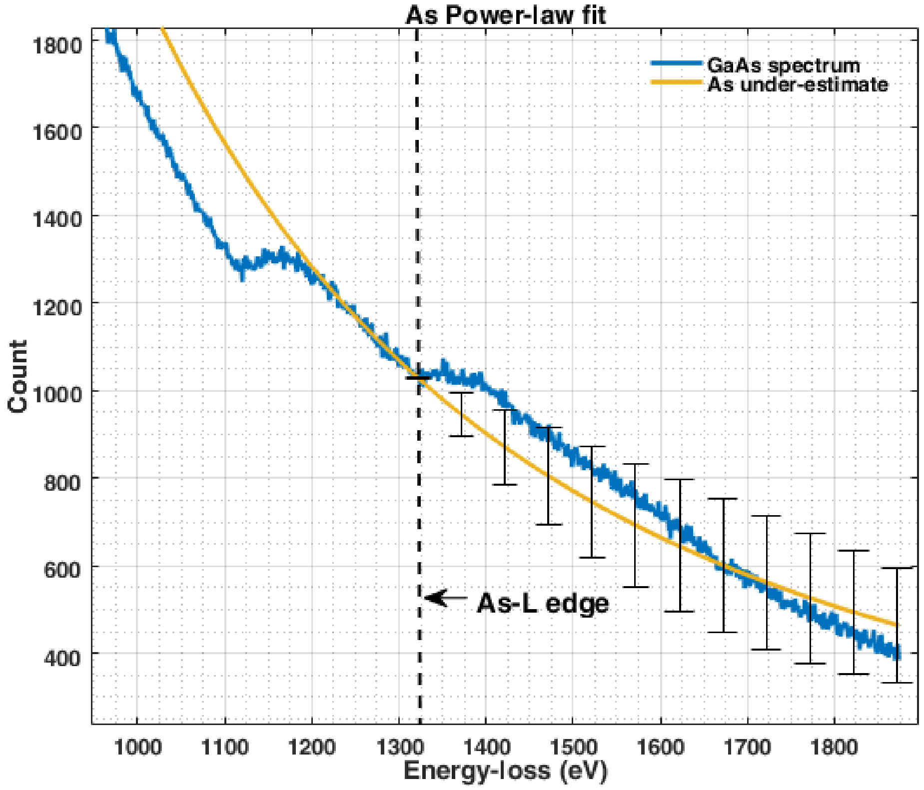
# Motivation

- EELS is a very important tool for elemental analysis of materials science
- Net core loss = spectrum – background
- extrapolating the background in the presence of preceding edges is difficult
- Background fitting in the presence of ELNES, EXELFS etc.
- Explore extrapolation from other regions such as post-ionization edge
- Explore extrapolations which are combination of fits in different region

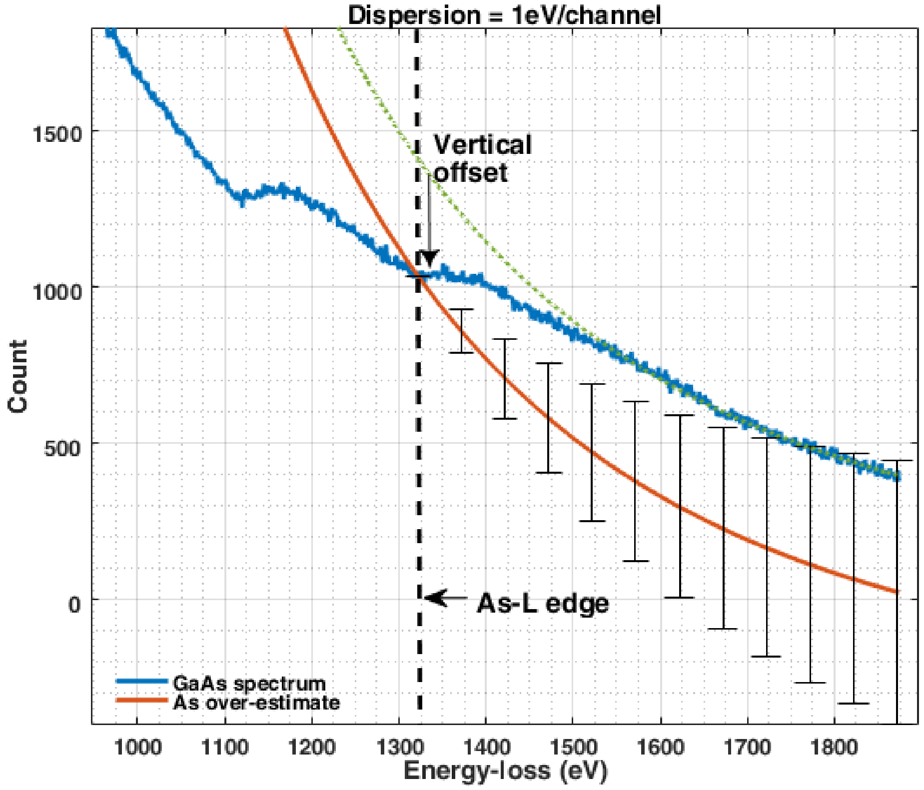
# Pre-edge region:

- Background crossing the spectrum - unphysical
- As-L edge can still be quantified by integrating only the positive core-loss region.
- This yields an under-estimate
- The Ga-L edge is straight forward as the it has very large pre-edge region.
- Highly associated with large systematic errors for large integration range.
- Systematic errors are difficult to identify by regression and quantification.



# Post-edge region:

- Extrapolate from end of the spectrum and offset vertically to cross through the edge onset
- Over-estimate of the core-loss edge intensity
- Poissonian statistical error bars are very large
- Highly associated with statistical errors and are difficult to identify by regression and quantification.
- For Ga-L edge, As-L edge is subtracted to provide larger post-edge region for extrapolation



# Optimal fit:

- Fits in pre-edge and post-edge regions provide under-and over-estimate of the core-loss edges
- Only backgrounds which are physically meaningful are retained
- Yields positive core-loss
- Have smaller error bars
- *More discussions in poster*

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