

## How to get the final $y$ from the experiment interferogram

I believe I have a solution on how to get the interferogram associated to the sparse spectra from the experimental interferogram acquired the Inbuia line.

From our talk today what they do today is:

1. They acquire an interferogram with the background information, let us call it  $I_B$ . This can be done “once”.
2. They then acquire interferograms from experimental samples, let us denote it  $I_E$ .
3. Then compute the Fourier transform of boh interferogram moving to the frequency domain using the Fourier transform. That is they compute  $y_B = \mathcal{F}[I_B]$ , and  $y_E = \mathcal{F}[I_E]$ .
4. The final interfegram, the one that is supposed to be sparse is  $y = y_E/y_B$ .

Great, now I will show conceptually (I cannot do the details) how to get the final  $y$  as a Fourier transform of the original interfegrams. Start by computing

$$I_B^{-1} = \mathcal{F}^{-1}[1/y_B].$$

From the formulas above we have

$$y = \mathcal{F}[I_E] \cdot \mathcal{F}[I_B^{-1}].$$

Now we can use the convolution theorem and conclude that

$$\mathcal{F}^{-1}[y] = I_E \star I_B^{-1}.$$

Done.