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Important analogies exist between the signal in the ABI and GI techniques. In both cases the peak edge FoM is to first approximation proportional to the refraction angle. The peak edge and integral FoMs are also proportional to the first derivative of the rocking curve (in ABI) and of the function  $G$  (in GI). Therefore, the sensitivity is maximized around the slopes of these functions, where their first derivative is maximum, and reaches the lowest values at the top and bottom positions, where the derivative is equal to zero.

We have demonstrated that the sensitivities of the three here-considered techniques present a different dependence upon the energy. The SNR is inversely proportional to the square of the energy ( $SNR \propto 1/E^2$ ) in PBI and GI, while it is inversely proportional to the energy ( $SNR \propto 1/E$ ) in ABI. This means that ABI is particularly favoured with respect to the other techniques if high energies are used.

In this study, the PBI, ABI and GI methods have been compared for the first time in the literature, and a comprehensive analysis of the different area and edge SNR and FoM has been carried out. We believe that the here presented formalism involving three of the most used phase-contrast imaging techniques may find widespread applications. On the one hand, the different definitions that have been given for the SNR and the FoM can be used to quantitatively compare images obtained with different setups and/or experimental parameters. On the other hand, the theoretical expressions that have been obtained for the SNR and FoM are useful in the setting up of experiments, allowing choosing the best technique and experimental parameters according to the properties of the object to be imaged and the experimental requirements (such as dose constraints, the needed spatial resolution etc.).

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