Response to W. K. Warburton's *Comments on Treatment of EXAFS data taken in the fluorescence mode in non-linear conditions by G. Ciatto et al. (2004). J. Synchrotron Rad. 11, 278–283*

Gianluca Ciatto,[a]* Francesco d'Acapito,[b] Federico Boscherini[c] and Settimio Mobilio[d,e]

[a]European Synchrotron Radiation Facility, BP 220, F-38043 Grenoble, France, [b]INFM, c/o ESRF, Gilda CRG, 6 Rue Jules Horowitz, F-38043 Grenoble, France, [c]INFM and Department of Physics, University of Bologna, Viale Berti Pichat 6/2, 40127 Bologna, Italy, [d]Department of Physics, University of Roma Tre, Via della Vasca Navale 84, 00146 Roma, Italy, and [e]INFM, LNF, Via E. Fermi, I-00044 Frascati, Italy. E-mail: ciatto@esrf.fr

We thank the author of this comment for appreciating our recent work and for his useful suggestions on how to extend the applicability of one of the correction methods proposed in our paper (Ciatto *et al*., 2004).

The author of the comment rightly suggests the improvement of our data-correction method II by taking into account the dead time of the fast channel of the digital electronics. In our paper, we preferred to neglect the dead time of the fast channel since we did not have a reliable measurement of it, but could only estimate it from the trapezoidal filter length. If we compare the nominal value of the *slow* channel dead time reported in the XIA manual (about 8.2 µs) and the one we have measured from the data (9.1 µs) we find an evident disagreement; thus, we were not completely confident in using the estimated value of 0.8 µs for the *fast* channel dead time.

However, if we assume this value as the real one and correct our data as suggested by using a numerical inversion of equation (2), the result is that the accuracy of method II can indeed be improved, as shown in Fig. 1. Method II can in this way be applied up to even higher count rates, very close to the maximum of the non-linearity curve and also slightly beyond.

Concerning the much wider range of applicability of this corrections strategy and of dead-time corrections in general, we would like to specify that we have never stated that our results are valid only in the case of a concentrated sample. The proposed correction strategies could also work in the case when only a small fraction of the counts are fluorescent counts, as the author of the comment suggests; nevertheless, at the present we have no experimental data available for this case, so that we preferred to limit our conclusions to the kind of materials up to now investigated.

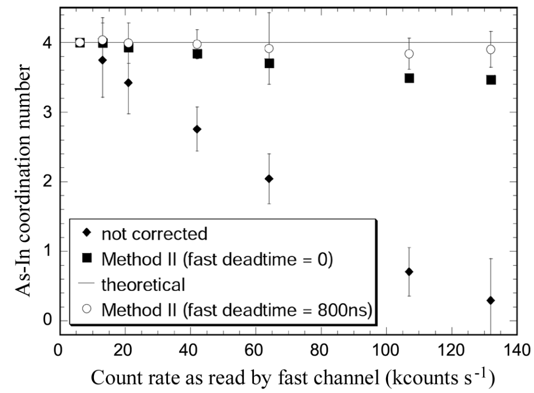

Figure 1
Arsenic coordination number in zincblende InAsP evaluated from uncorrected data and from data corrected using method II, both with and without fast-channel dead-time correction (open circles and full squares, respectively). For clarity, error bars are reported for only one of the corrections.

We agree with the author that, when only a very small fraction of the counts are due to fluorescence, the correction contains essentially no EXAFS signal; nevertheless, in the case of a concentrated sample, correction with method II allows an excellent recovery of a signal which would otherwise be almost absent (Figs. 3 and 5 of our paper) by using the EXAFS signal of the fast channel. Since in the dilute limit this is not true, the correction of real experimental data with method II might not be as good as in the concentrated case and may be comparable with that of other corrections strategies (*e.g.* method I); further measurements are necessary to compare the various correction methods in the dilute limit.

Since the amount of EXAFS signal in the correction factor of method II scales with the fraction of total counts that are fluorescence counts, and the rigorous relationship at the inversion point above the absorption edge is $n_{\rm FM} = \delta m_{\rm t}/(n_{\rm t} + \delta)$ ($n_{\rm t}$ is the true count rate below the edge, $m_T/n_T = 1/{\rm e}$), for intermediate dilution levels an amount of EXAFS enters the correction and we lose energy resolution. Since, on the contrary, methods that use the numerical inversion of the dead-time formulation always preserve the energy resolution, it is not straightforward that method II should give superior results even in this case.

References

Ciatto, G., D'Acapito, F., Boscherini, F. & Mobilio, S. (2004). *J. Synchrotron Rad.* **11**, 278–283.

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