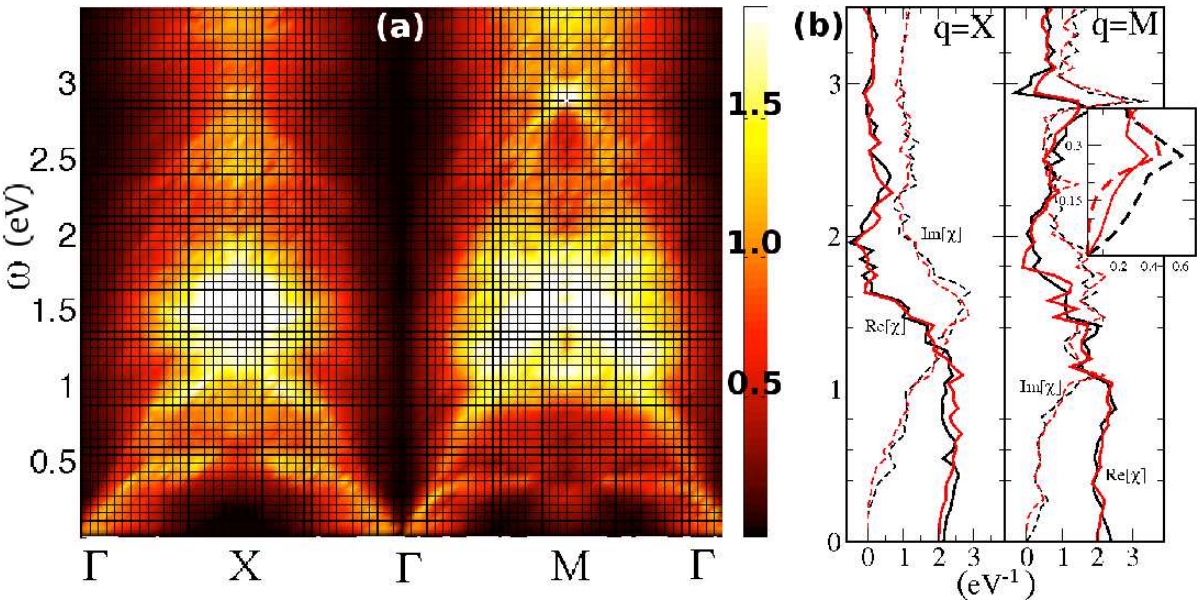

FIG. 7: (color online) (a) Imaginary part of $\chi_0(\mathbf{q},\omega)$ (eV), for undoped LaOFeAs, as a function of $\mathbf{q}$ and ω. Results are plotted along $\Gamma - X - \Gamma - M - \Gamma$ directions. (b) Plot of the real and imaginary parts of χ_0 as a function of ω for $\mathbf{q}$ corresponding to the X and M points of the BZ. Black and red refer to $x = 0$ and $x = 0.14$ respectively. The inset of (b) shows the low frequency part of χ_0 at M for $x = 0$ and $x = 0.14$ (black and red dashed respectively), and at one q-point point close to M corresponding to the edge of the volcano-like structure of Reχ_0 (thin red line).

the Im$\chi_0(\mathbf{q},\omega)$. Interestingly, if we move slightly away from M (on the edges of the volcano structure discussed above), we recover a linear trend starting at $\omega = 0$.

The band decomposition of Im$\chi_0(\mathbf{q},\omega)$, reported in Fig. 8 along the $\Gamma - M - \Gamma$ line, shows that the inter-band $(e-h)$ contributions dominate the high frequency part, and are also responsible for the low frequency peak around M. The two dispersive peaks at low frequency discussed above originate from the intra-band transitions ($e-e$ and $h-h$); in particular, the relatively high frequency branch comes mainly from electronic bands, while the low frequency one from hole bands. Fig. 8 clearly shows that the $h-h$ and $e-e$ contributions are quite asymmetric; this asymmetry is clearly a consequence of the richness of the electronic structure of LaOFeAs near E_F.