How X-rays changed the way we understand Star Forming Regions.

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Abstract / Star Forming Regions (SFRs) and star formation processes are usually associated to occurs in cold ambients filled of gas and dust structures. In such scenario, stars sequentially forms shrouded by dense Inter Stellar Medium (ISM) and/or circumstellar gas and dust structures. In fact, they have been studied and classified according to their Infrared (IR) to millimeter spectral energy distribution.
This cold vision has changed since late 70's and early 80's thanks to the first X-ray (soft: 0.2-2.4 keV) *EINSTEIN* and *ROSAT* observatories, that confirms all massive stars ($M \geq 8\ M_{\odot}$) are strong X-ray emitters. However the bulk of the stellar population at lower masses, generally fainter in X-rays, are strongly absorbed in the near infrared, and even absorbed in soft X-ray bands. Thus, unbiased stellar population studies in SFRs has remained ill-constrained and biased, waiting for more sensitive X-ray telescopes capable to observe hard X-rays. Limited by the available instrumentation of the epoc, this subfield of astrophysics remained without major progress for more than 20 years.
This ended in 1999 and early 2000 with the launch of the *Chandra* and *XMM-Newton*, respectively. Both X-ray observatories that combines high sensitivity in the 0.3–12 keV energy range with spectacular spatial resolution (≈ 0.5" on axis) have revolutionised all the aspect of the astrophysics, with major empathy in SFRs. For first time we were able to determine the unbiased stellar population in SFRs, and improving the knowledge of the physical nature of the X-ray emission observed in young stars for all mass ranges. Very recently, new sophisticated techniques of analysis greatly improved the capability to detect faint X-ray sources and disentangle point source and *true diffuse emission* contributions in nearby Galactic SFRs. Since milestone work for study of X-ray diffuse emission in Carina (Townsley et al. 2011) and very recently in the massive stellar association Cygnus OB2 (Albacete Colombo, et al. 2017), the genuine discovery of diffuse X-ray emission change the vision of how young stars, and even planets, forms and evolves in extremely hot ISM ambients.

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