



# A Deep X-ray View of the Small Magellanic Cloud

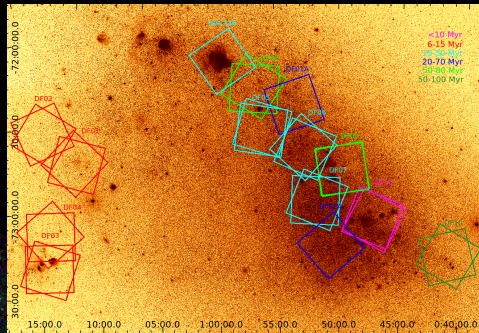


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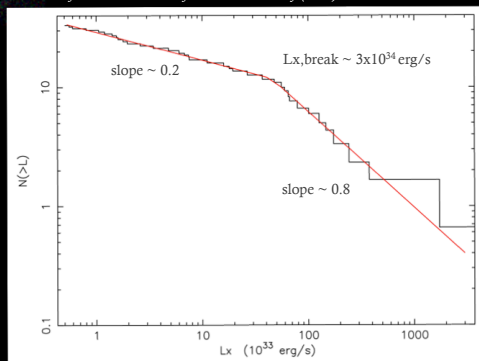
## MOTIVATION

Deepest X-ray luminosity functions (XLFs) for extragalactic X-ray binaries (XRBs) ever recorded:

- XRB formation efficiency =  $f(\text{age})$
- XLF evolution up to 100 Myr (& influence of propeller effect)
- Duty cycles of accreting pulsars
- Parameters relevant to XRB formation & evolution
- SNRs, early-type stars, late-type coronal sources



A DSS2 blue image of the SMC with overlaid the footprints of the 11 XVP fields and 3 archival observations (NGC346, DF01A & DF02A) used in this study. Different colors indicate the age of the dominant stellar population in each field based on the star-formation histories of Harris & Zaritsky (2004).



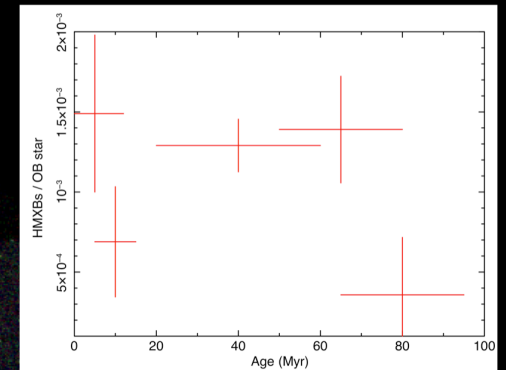
X-ray luminosity function (XLF) of High-Mass XRBs: Deepest XLF ever recorded for a galaxy! Evidence for a break, consistent with accretion in an inhomogeneous environment & the onset of the propeller effect (c.f. Shtykovskiy & Gilfanov 2004)

## SURVEY DESCRIPTION

- Cycle 14 XVP (PI A. Zezas)
- 11 fields sampling different stellar populations & 3 archival fields with similar exposures (100 ks/field; split in 2 allowing source variability studies)
- Total exposure: 1.1 Ms
- Total area:  $\sim 1.1 \text{ deg}^2$
- Limiting flux :  $\sim 1.2 \times 10^{-15} \text{ erg/cm}^2/\text{s}$  (0.5 – 7 keV)
- Ancillary multi-wavelength coverage: XMM-Newton, CTIO/ESO, MCELS, OGLE-III, MCPS, *Spitzer*, *Herschel*

## FIRST RESULTS

- $\sim 1015$  sources detected at  $5\sigma$  significance level (limiting  $L_x \sim 5 \times 10^{32} \text{ erg/s}$ ; 0.5 – 7 keV)
- $\sim 65$  (Wing) – 75 (Bar) sources per field
- 20 pulsars detected (out of the 34 known in these regions)
- 2 new pulsars
- 56 sources associated with an OB star from the MCPS catalog (Zaritsky+2002, AJ, 123, 855) within  $1.5''$
- 12 SNRs detected (all listed in Badenes+2010, MNRAS, 407, 1301)



Formation efficiency of High-Mass XRBs as a function of age: evidence for a peak at  $\sim 40 - 60 \text{ Myr}$

Background image: "True color" unsmoothed mosaic of the 14 SMC fields used in this study. Red, green and blue correspond to 0.5-1.2 keV, 1.2-2.0 keV, and 2.0-7.0 keV

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