eROSITA - StarsWG

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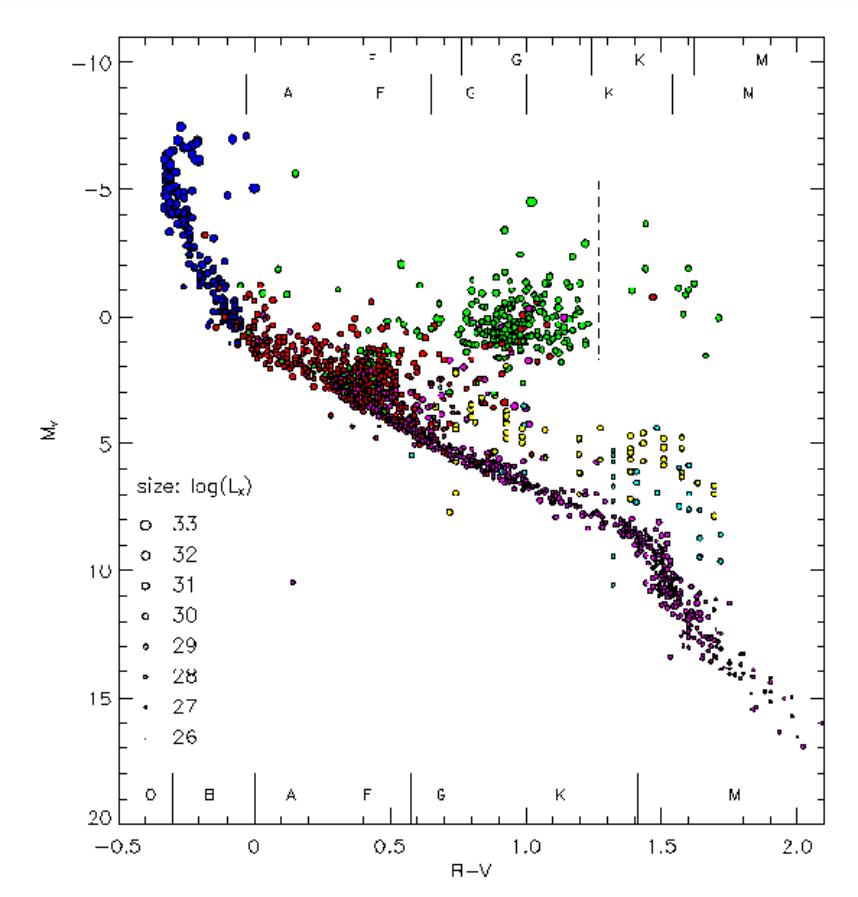
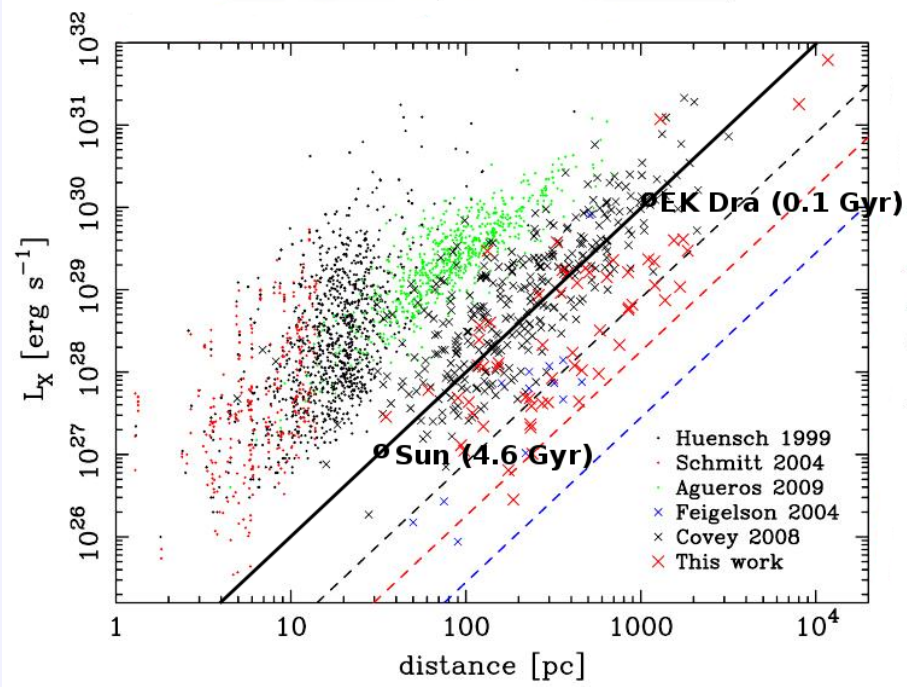
eROSITA - all-sky survey and stellar content



'The X-ray HRD' (Güdel 2004)

eROSITA survey:

$L_{\mathrm{Xmin}} \approx 1.0 \times 10^{24} \times d^2(\mathrm{pc})\ \mathrm{erg\,s^{-1}}$



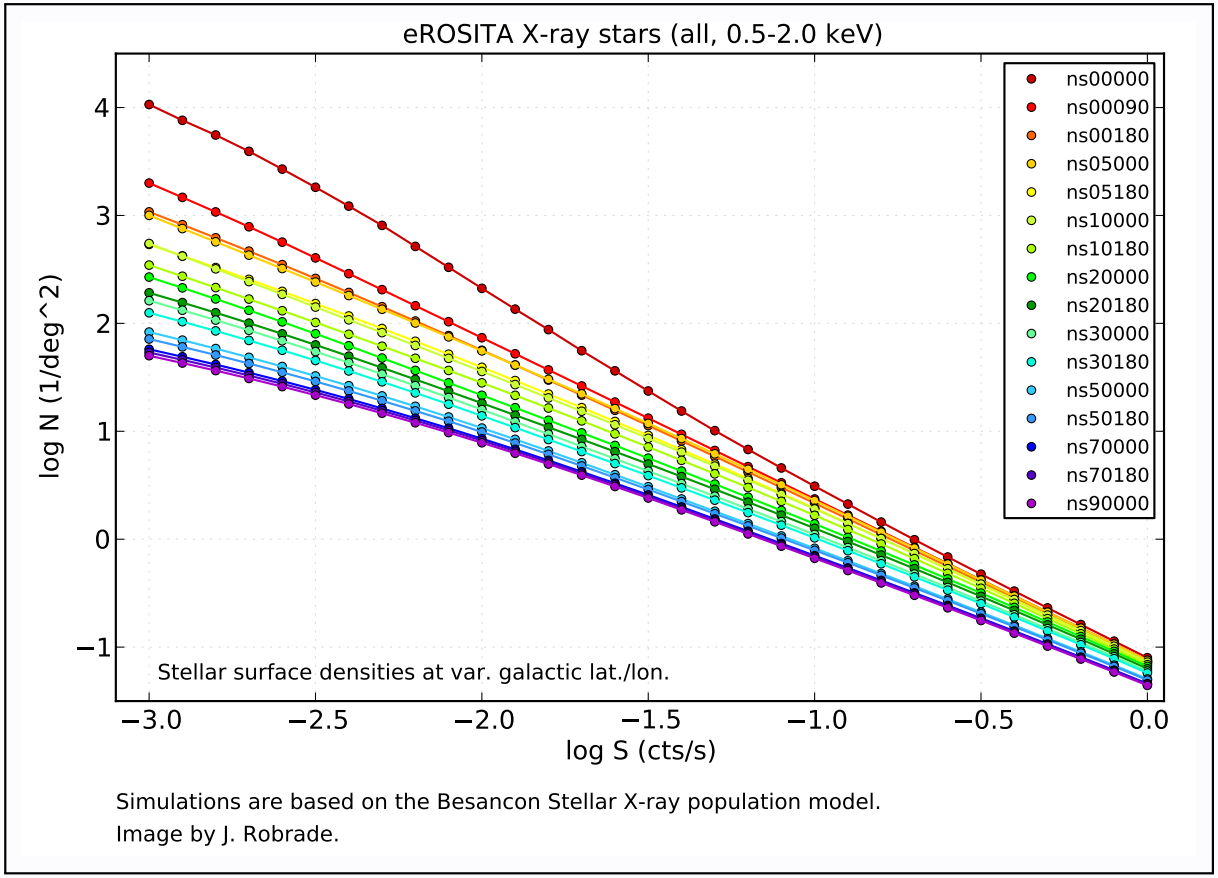
'eRASS sensitivity with two Suns'

(adapted from Wright et al. 2010)

eROSITA (black line) vs.

ROSAT: survey+pointings (dots)

Chandra: CDF-N, ChaMP, COSMOS (crosses)



Some useful numbers (eRASS8):

- Besancon model: total ~ 0.7 million stars
- av. stellar densities: ~ 6 per deg^2 (pole) to > 50 per deg^2 (disk)
- lim. $F_{\rm X} \sim 1 \times 10^{-14}$ erg cm^{-2} s^{-1} (logS = -1.9 [cts/s], 20 cts/1600s)

eROSITA early science - eRASS1

Stellar science with eRASS1

sample size $\sim$ 50000 stars

- census of stellar content
- new sources (already better than RASS)
- hard/absorbed sources, e.g. SFRs
- new IDs - more comprehensive opt./IR data available
- comparison to RASS (and other X-ray surveys)
  - long-term variability (baseline 25 years)

eROSITA early science - pointings

η Cha (B8V) and field (DSS)

The η Cha cluster

- nearby (100 pc) star forming region, intermediate age (5 – 8 Myr)
- deep south (-73.5 deg ecl. lat), German half-sky
- early science and test of field scan mode

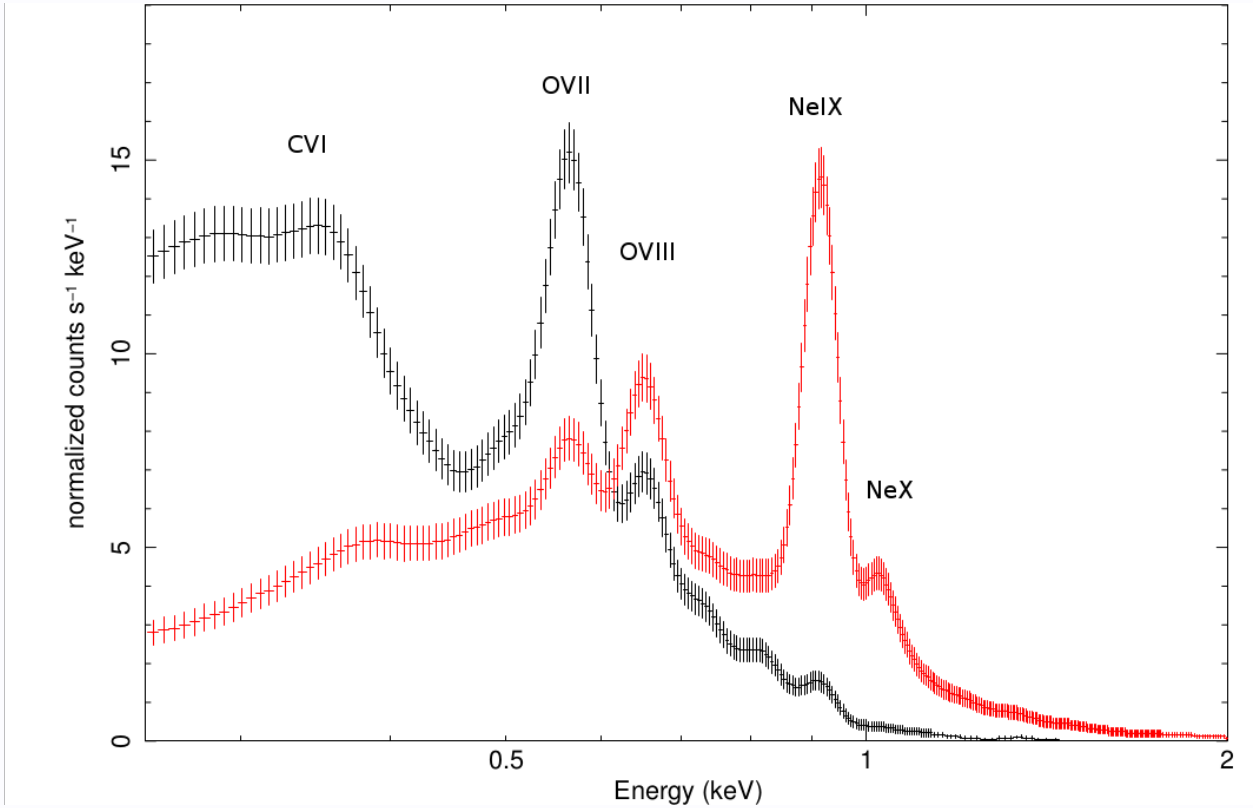
The η Cha cluster

> Because of its unique character, the η Cha cluster will be an important laboratory for understanding a number of important astrophysical issues: the origin of dispersed PMS stars; the extent and history of the giant Sco-Cen OB association; the dissipation of molecular material and consequent dynamical evolution of open clusters; the magnetic activity, circumstellar disks, binarity, and other properties of older PMS stars; and the properties of a coeval population of PMS brown dwarfs likely to be present in the cluster. (Mamajek et al., 1999)

The open cluster η Cha:

- part of Oph-Sco-Cen association (OSCA)
- SFR with young stars at var. evolutionary stages (CTTS, TO, WTTS)
- X-ray discovered (ROSAT/HRI), key target (Herschel, HST, Spitzer, XMM...)
- test case for PMS-evolution, disk dispersal and planet formation
- dispersed population expected, optical surveys ongoing
- **Why eROSITA? X-rays are a prime indicator of young stars!**
  - 8 ks depth: $\log L_{\mathrm{X\,lim}} \approx 27.6$ erg s^{-1} ($\sim$ 4 x 4 deg, 2 days)
  - free of dark clouds, low absorption
  - detect & characterize stellar population down to low mass regime

eROSITA - performance verification



eROSITA spectra of Procyon and TW Hya (5 ks on-axis, $F_X \sim 5 \times 10^{-12}$ erg cm^{-2} s^{-1})

- stars: emission line dominated spectra/bright point-sources
- spectral resolution at low/med energies

eROstars : science projects

Hamburg projects/collaborations

- stellar census - the global view
- population studies: solar neighborhood, moving groups & SFRs
- specific objects: ApBp stars, young BDs, planet-bearing stars...
- the corona-chromosphere connection
- diffuse stellar components

German eROSITA institutes

- Tuebingen: young clusters/star-forming regions (Kavenagh, Whelan)
- AIP: optical/massive stars (Schnurr)
- MPE: nucleosynthesis/X-ray bubbles (Diehl)

Russian side: no stellar working group scheme so far; collaborations very welcome

Inter-National: several high-expertise groups expressed interest in eROSITA