# Supernova remnant candidates in the ROSAT All-Sky survey

and their prospects for eROSITA

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MPE

Supernova remnants

- Remains of supernova explosions
  - Compress, enrich and heat the ISM
  - Trigger star formation
  - Accelerate cosmic rays

- Detectable in various wavelengths, for example:
  - Radio: Synchrotron emission
  - Optical: line emission
  - X-ray: thermal emission of shocked hot gas (in some cases: non-thermal emission)
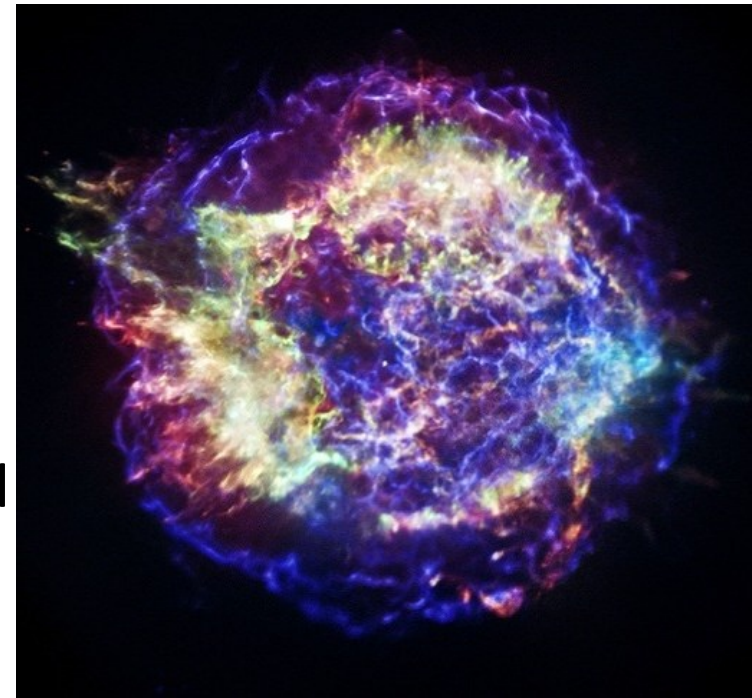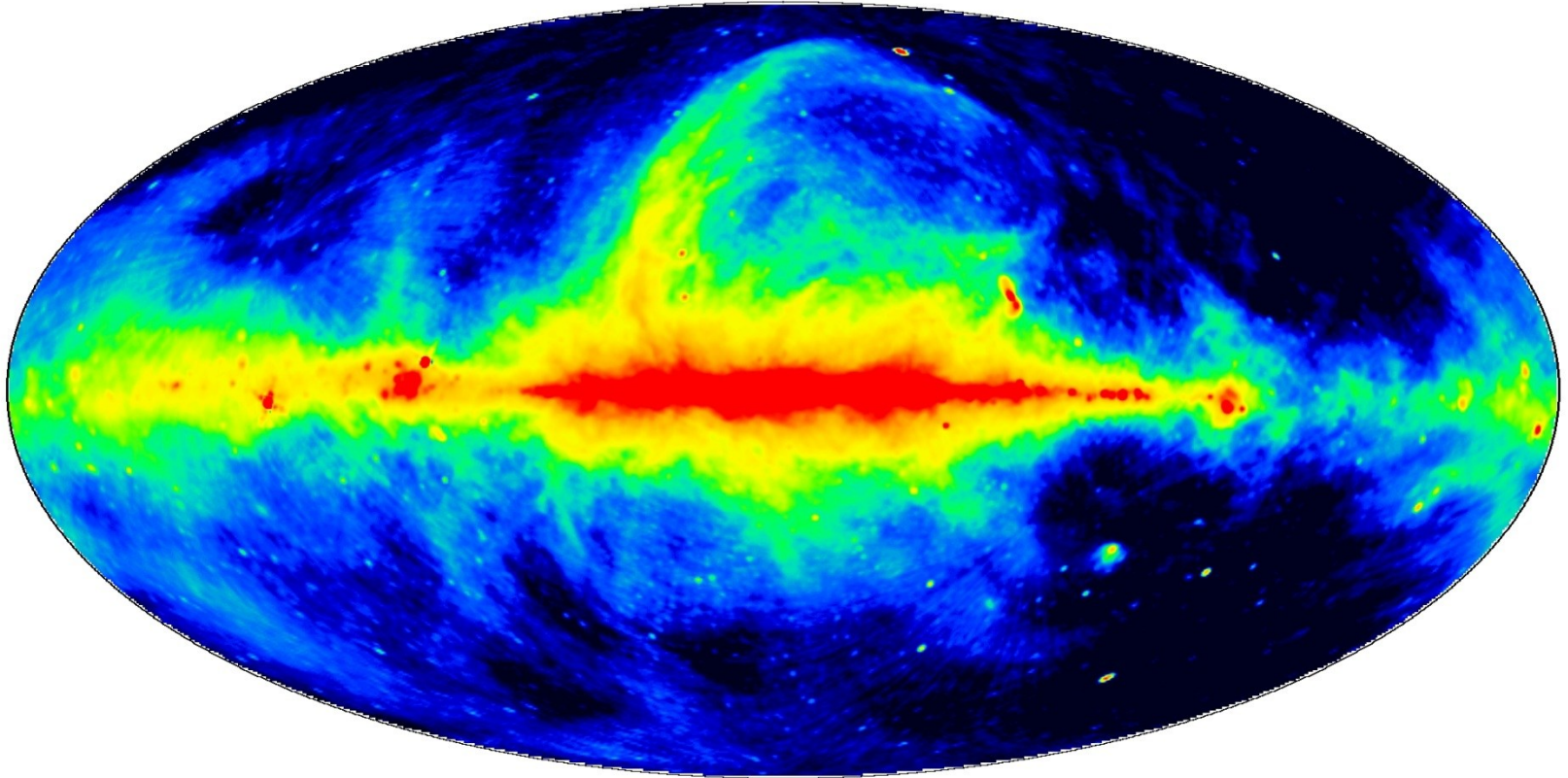
Known and missing SNRs

- About 250 known in the Galaxy
- 1-3 SNe per century
- Lifetime about 10 to 100 kyrs
- Only 7 SNe directly observed

SN 1604
Kepler

SN 1572
Tycho

SN 1181

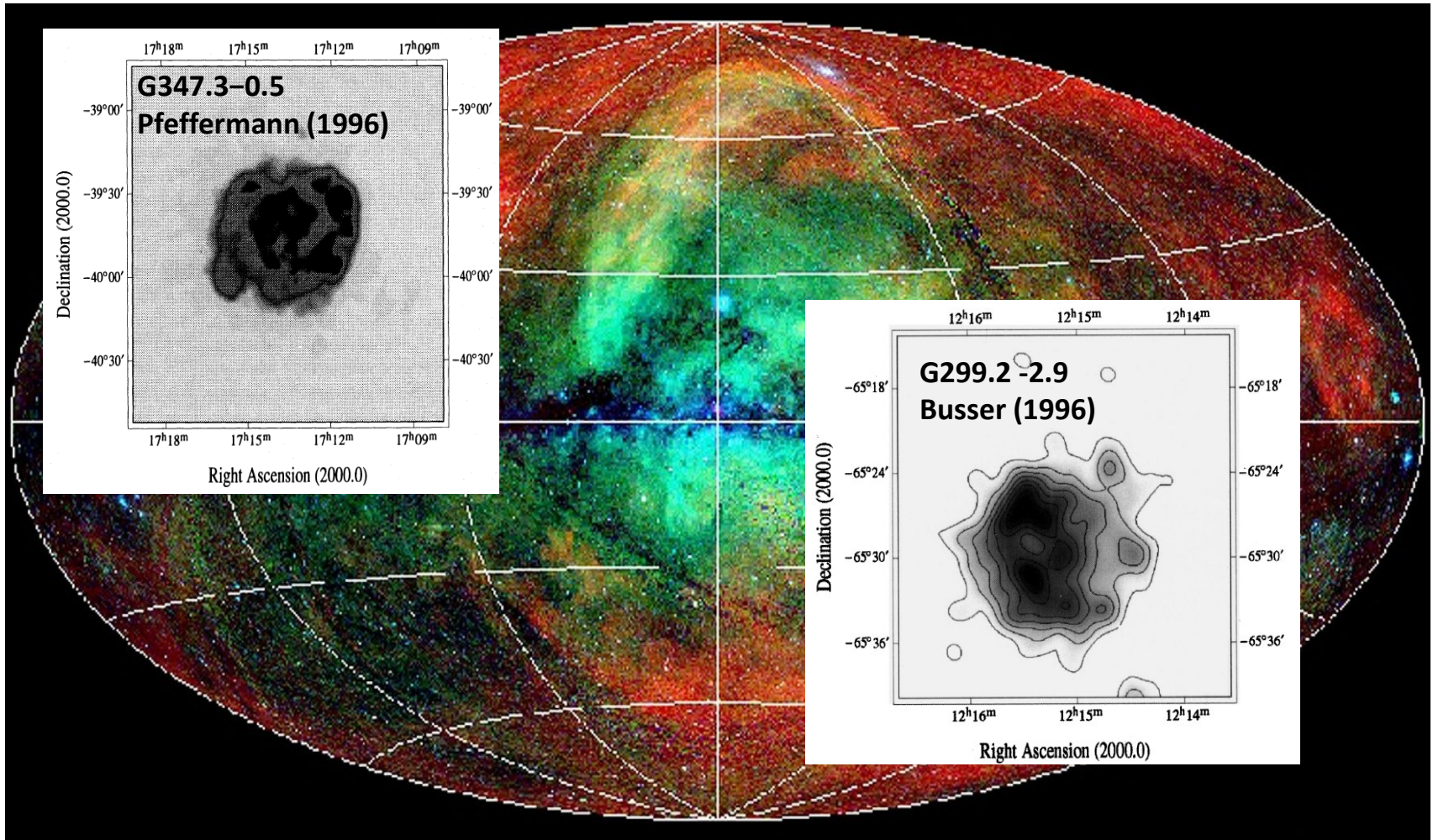SN 185

SN 386

SN 1006

SN 1054
Crab
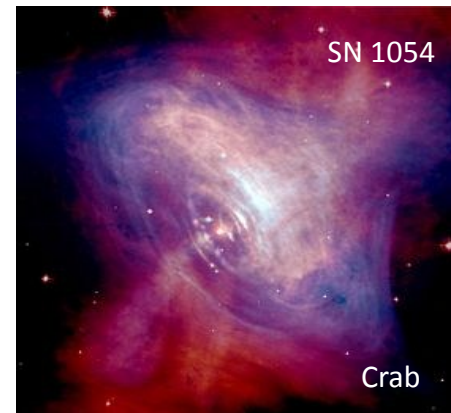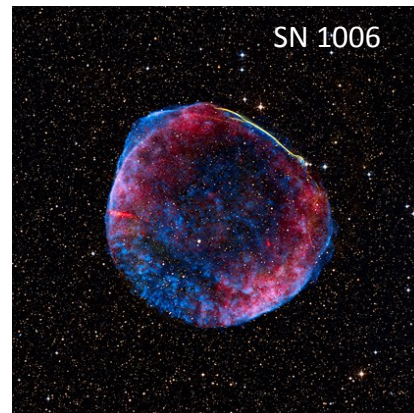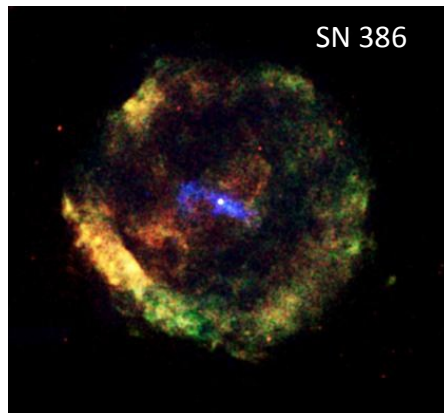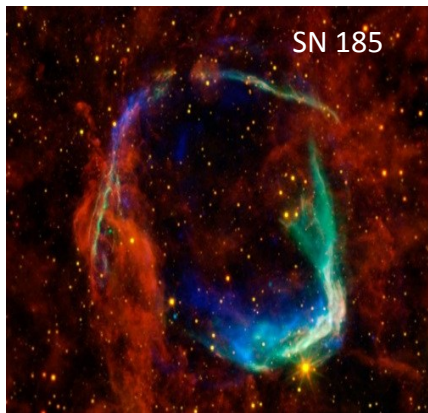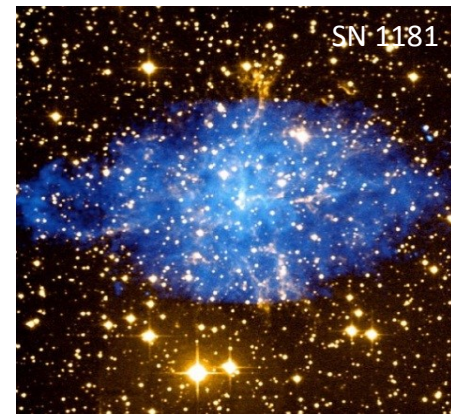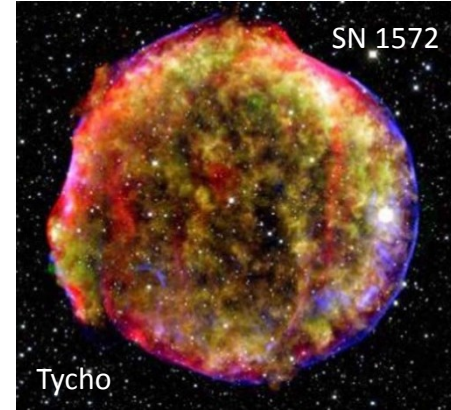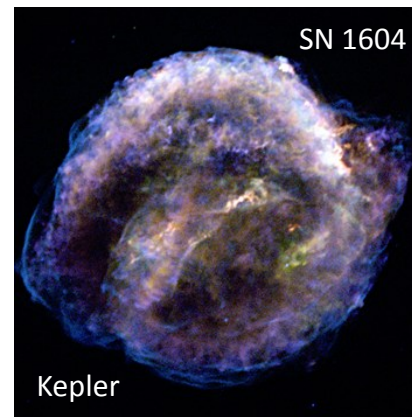
408 MHz

Jodrell-Bank 250-feet + Effelsberg 100-m + Parkes 64-m

- Most SNRs were detected in radio surveys
- BUT: Selection effects → biased sample (Green 2005)

ROSAT: First imaging X-ray all-sky survey

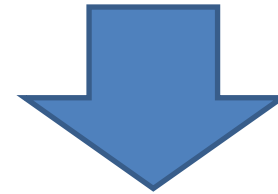→ Search for remnants in the X-ray band

Systematic search

Expectation

- Simulation of Milky way with
  - Two spiral arms
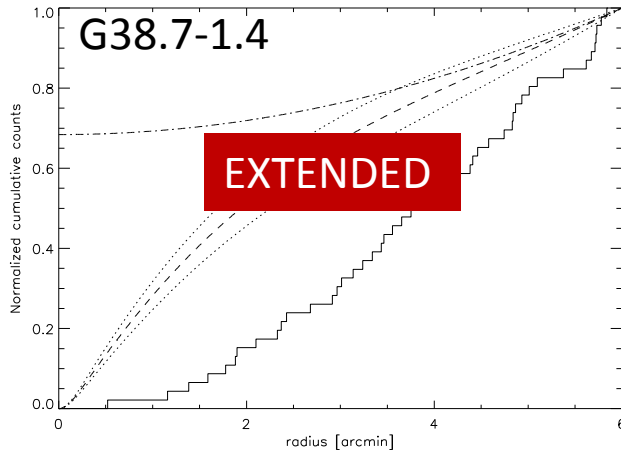 - Explosion energy: 10^{51} erg/s

- In the RASS
  - About 205 SNR should be seen
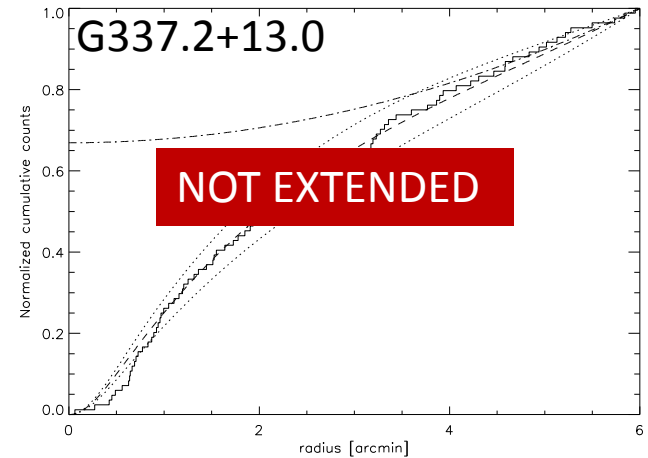 - About 80 known SNR detected so far

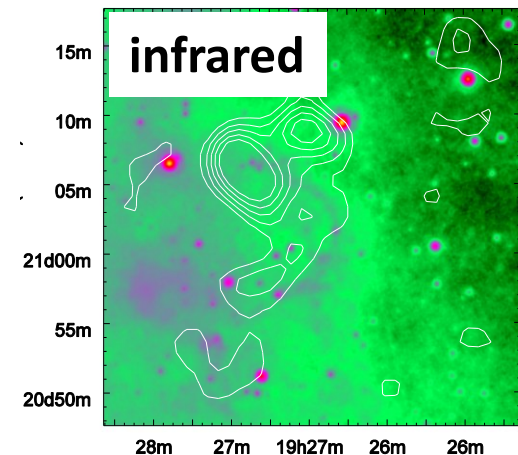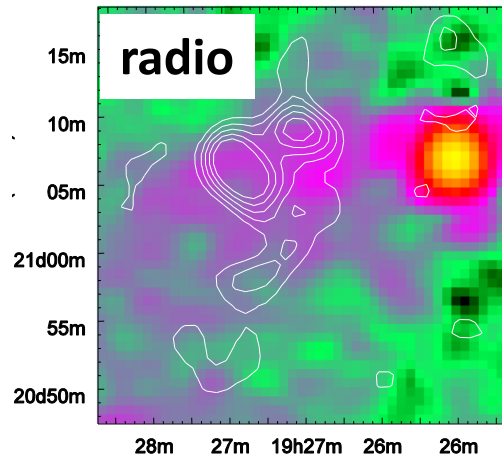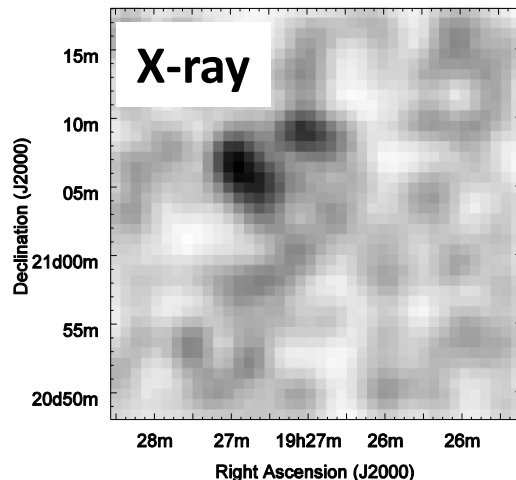→ WERE ARE THE REMAINING SNRs???

Systematic search in RASS

- 210 sources (Busser 2002)
- Cumulative count rate profile vs. PSF

G38.7-1.4

EXTENDED
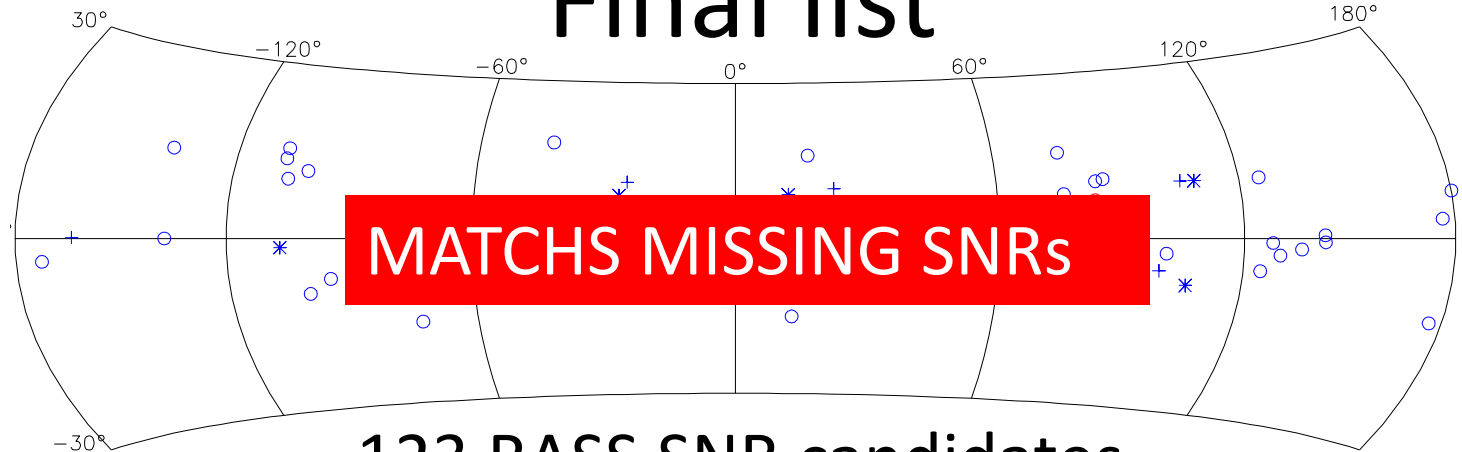
H. Böhringer (2000)

G337.2+13.0

NOT EXTENDED

- correlated with all-sky surveys in H_α, UV, γ-ray and …

X-ray

radio

infrared

- Correlation with catalogues & archival X-ray data

Final list

MATCHS MISSING SNRs

123 RASS SNR candidates

- 73 sources with S/N>5σ
- 16 with diameter > 1°

G100.2−2.7 (0.5−2.0)

30'

G108.3+9.9 (0.5−2.0)
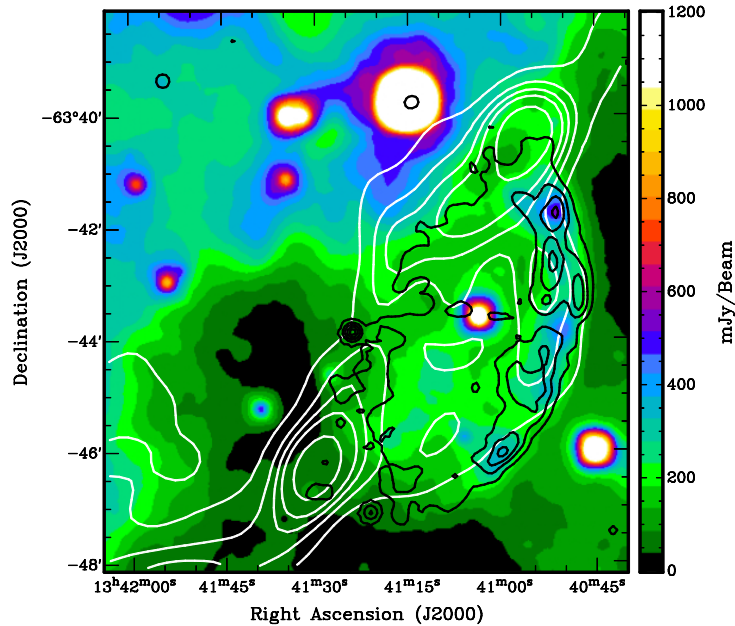
4°
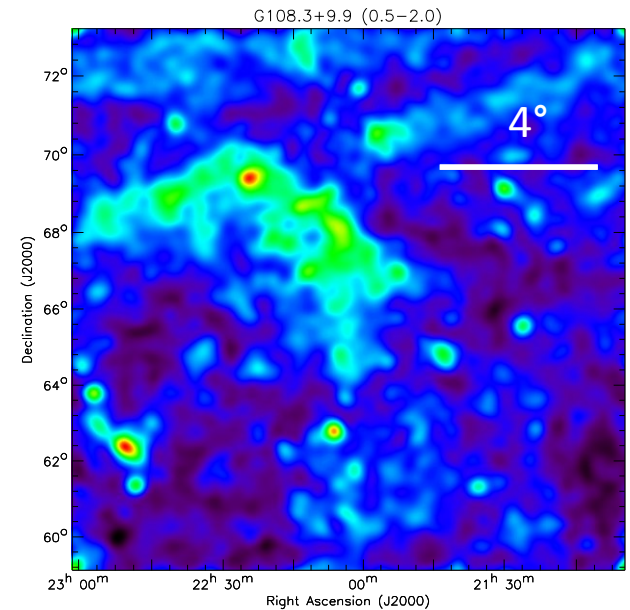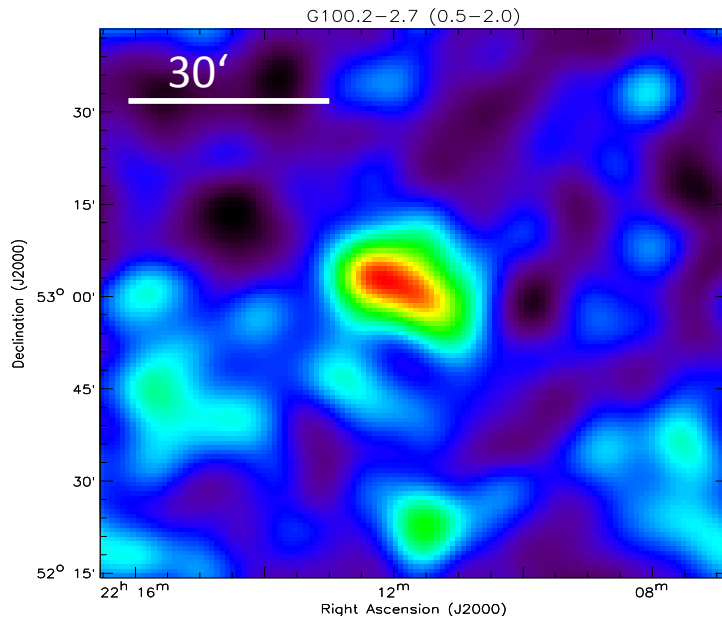
An example:
The supernova remnant G308.4–1.4

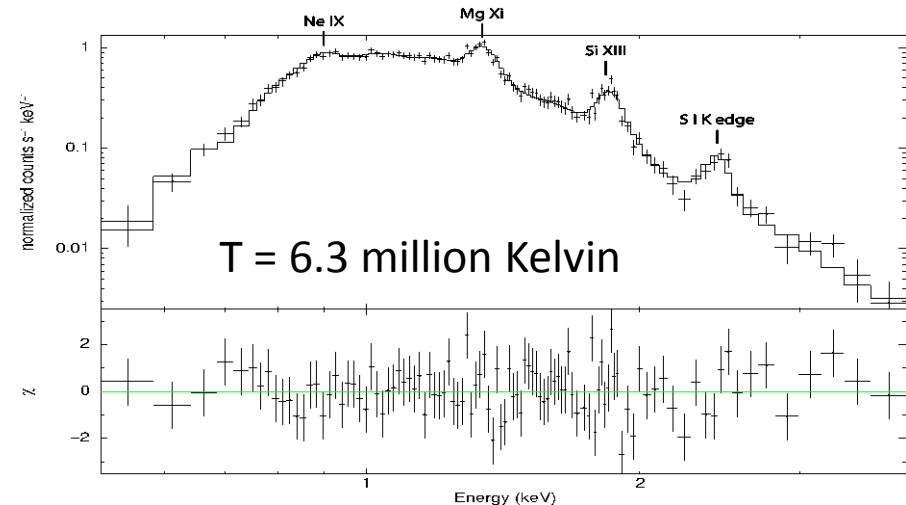- Candidate in the MOST supernova remnant catalog
  (Whiteoak & Green 1996)
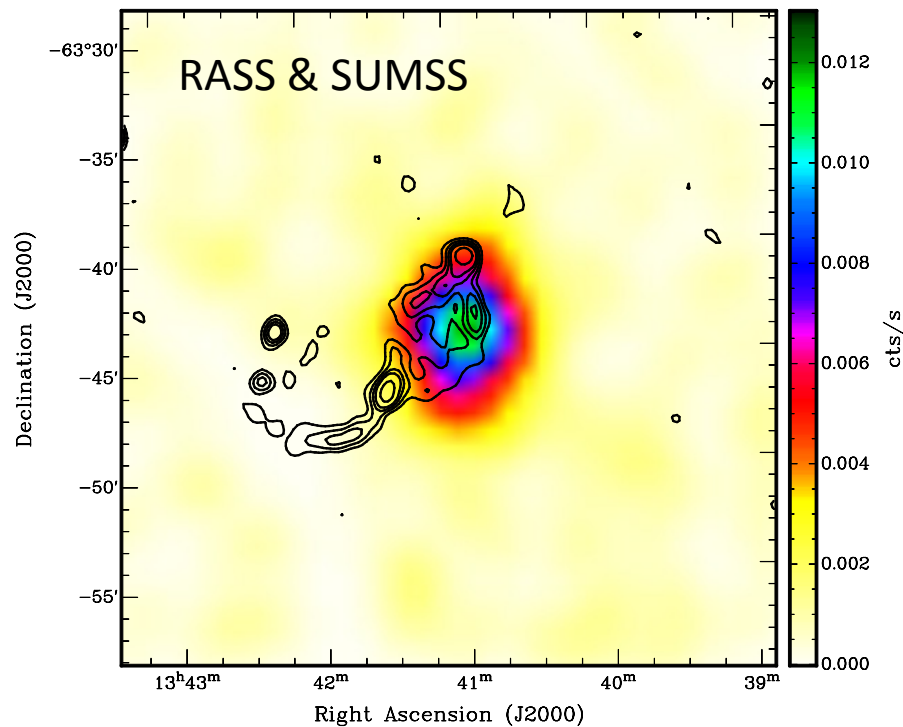
Multiwavelength data
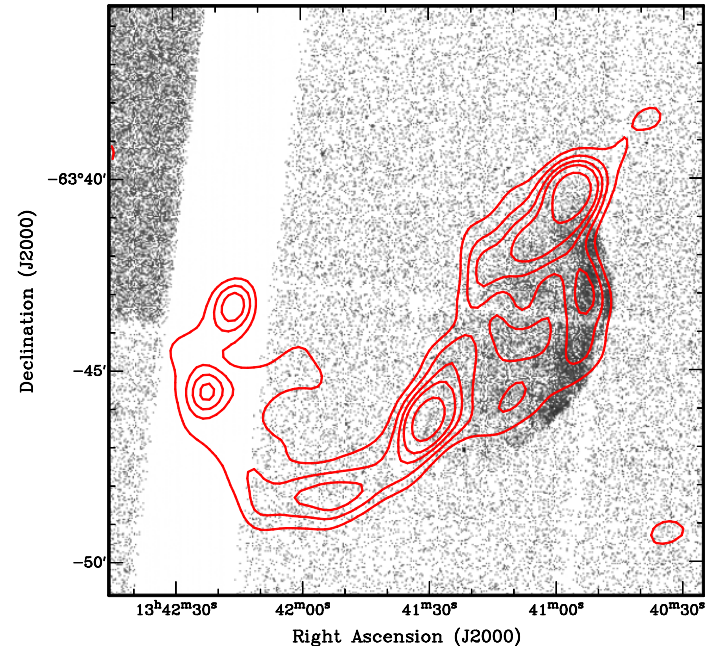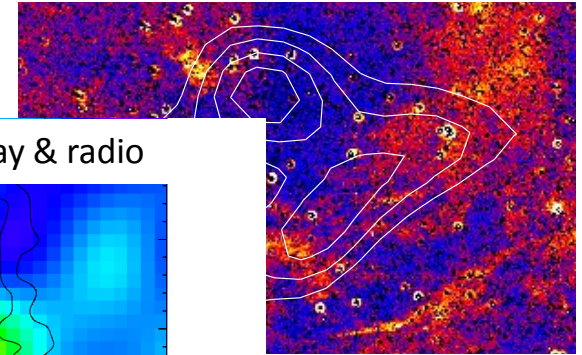
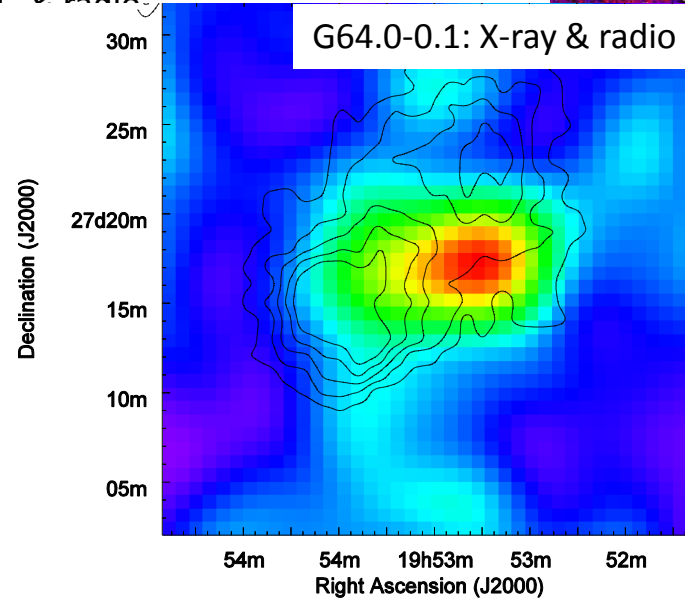WISE IR, Chandra & ATCA 1.4 GHz

Chandra & ATCA 1.4 GHz

T = 6.3 million Kelvin

SNR G308.4-1.4

Promising candidates

G312.4+4.8: X-ray , infrared & H$_\alpha$
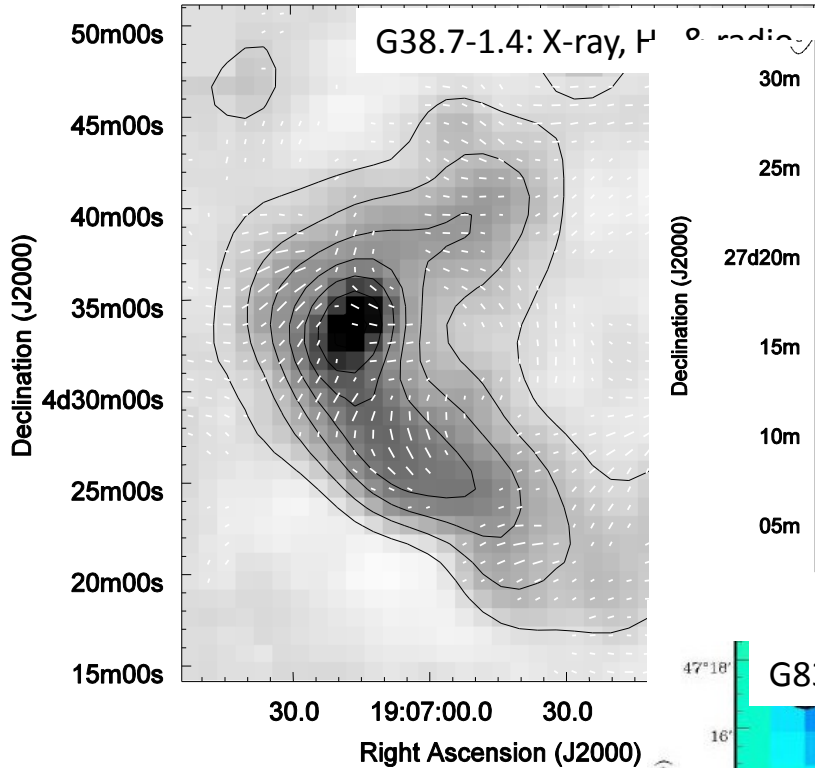
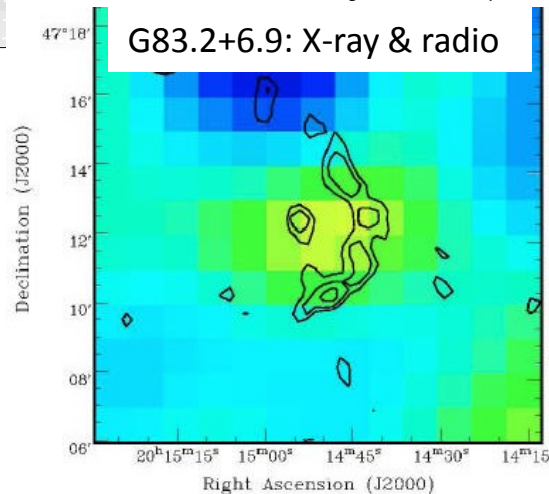G38.7-1.4: X-ray, H$_\alpha$ & radio

G64.0-0.1: X-ray & radio

G55.6+2.1 (WiseW4)

(Chandra ACIS-I) & infrared
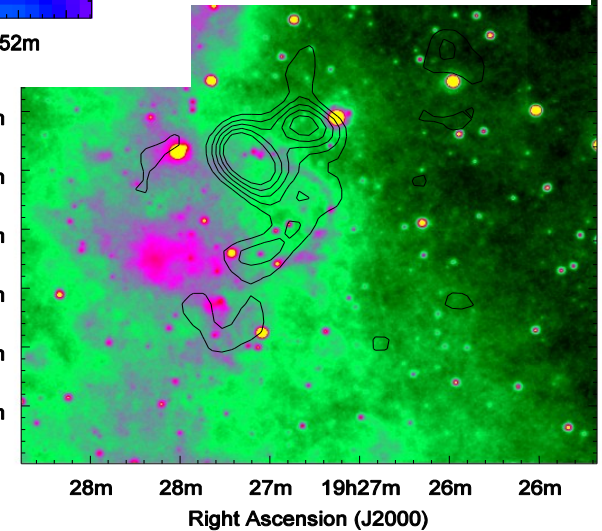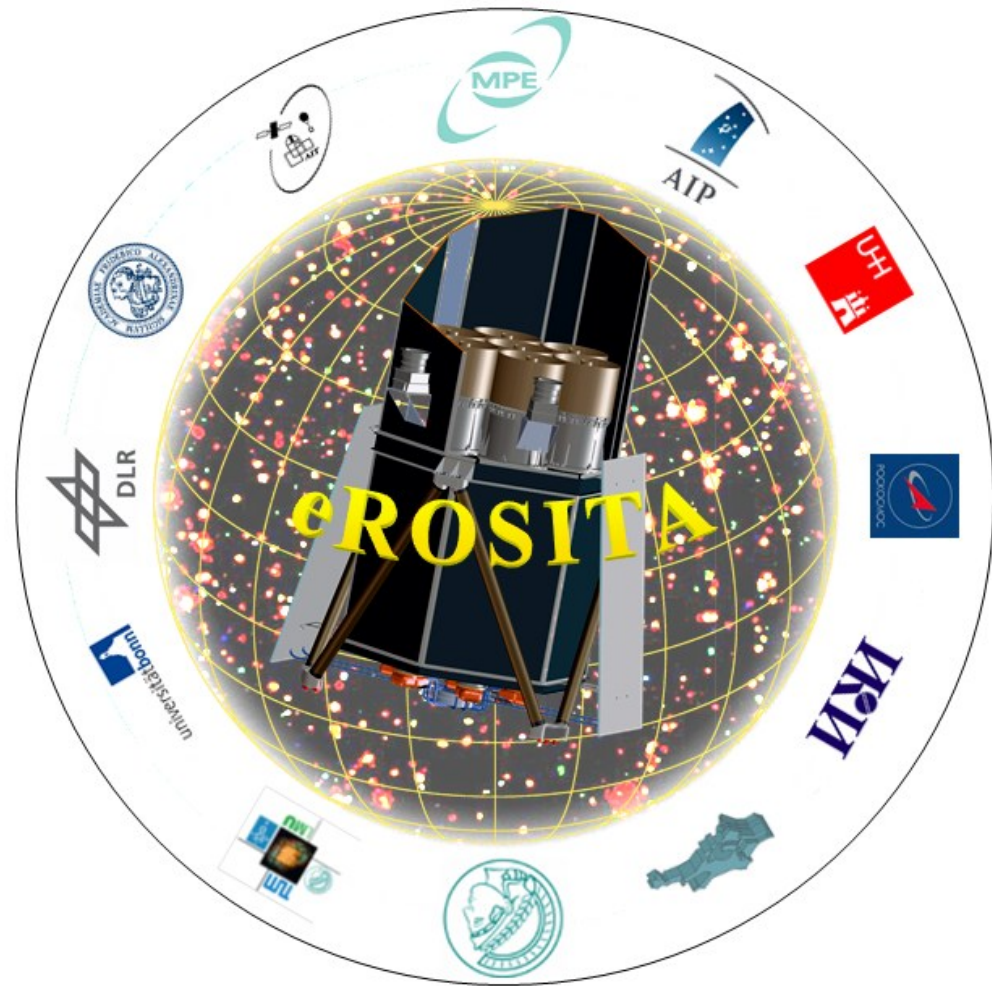
G83.2+6.9: X-ray & radio

Prospects for eRosita

- Launch in 2016
- 20x more sensitive
- Study all candidates
  - In particular, large remnants

(Talk by Peter Predehl)

- Simulation
  - About 600 SNRs should be seen

Summary

- Find missing SNRs in X-rays
- 123 Candidates

→If SNRs, no discrepancy in X-rays

- eRosita
  - Study candidates in detail
  - >300 new candiates expected

Thank you for your attention