# *Hot Interstellar Medium in the Large Magellanic Cloud*
# *The eROSITA View*

Martin Mayer, Manami Sasaki, et al. – Remeis-Observatory Bamberg (FAU)

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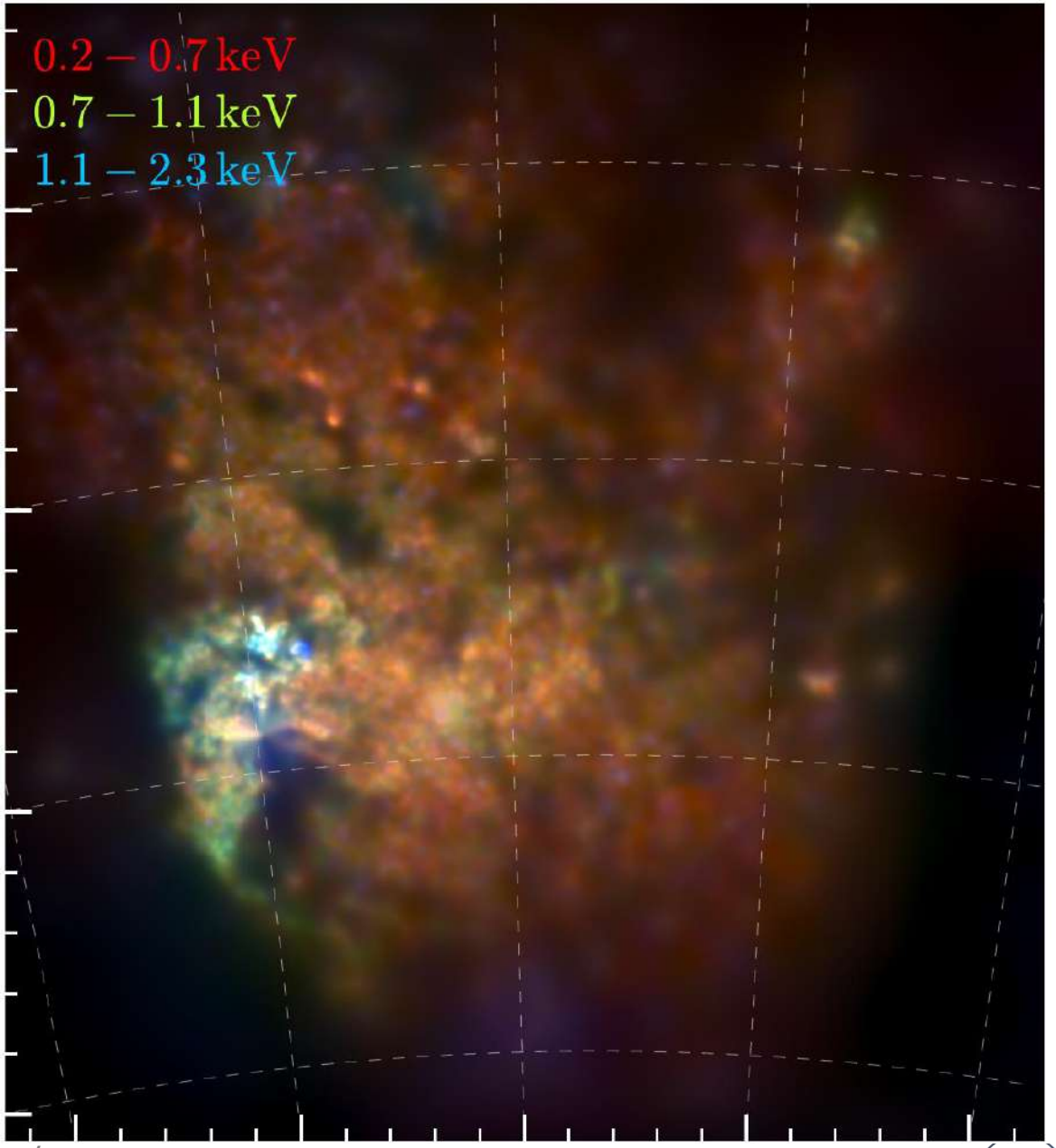
# Diffuse X-rays from the LMC

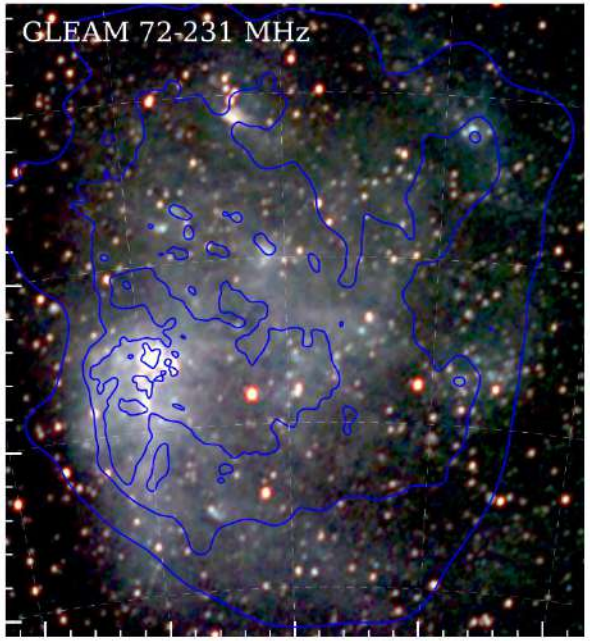
- eROSITA all-sky survey provides deep exposure
  - ➢ eRASS:4.5 data most sensitive X-ray view of LMC

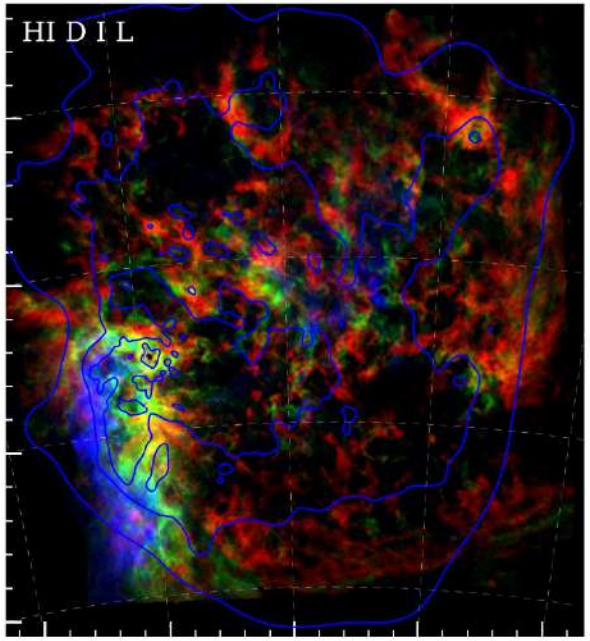
- Analyze diffuse X-ray emission (exclude point sources & SNRs) to study hot ISM (~ $10^7$ K):
  - Foreground absorption
  - Distribution and temperature of hot plasma
  - Elemental abundances
  - Synchrotron emission
  - ➢ Comparison to multiwavelength data

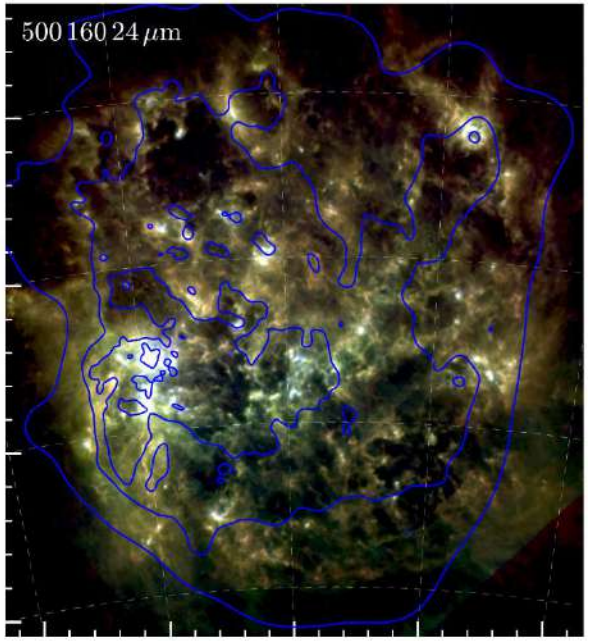


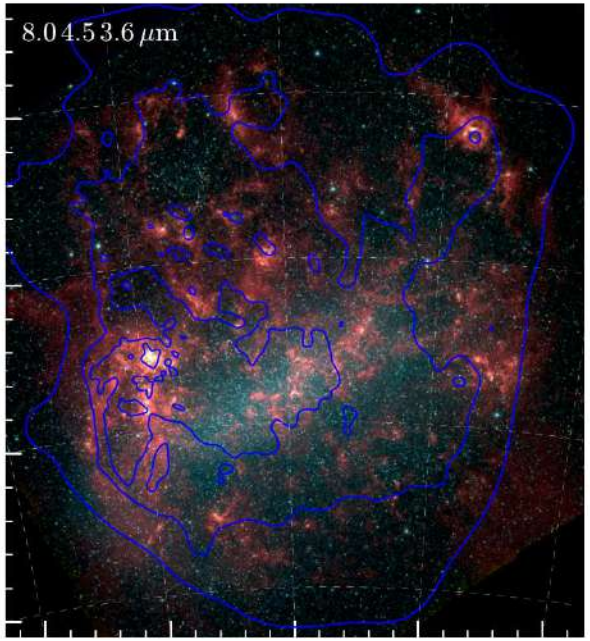
# Multiwavelength View of the LMC

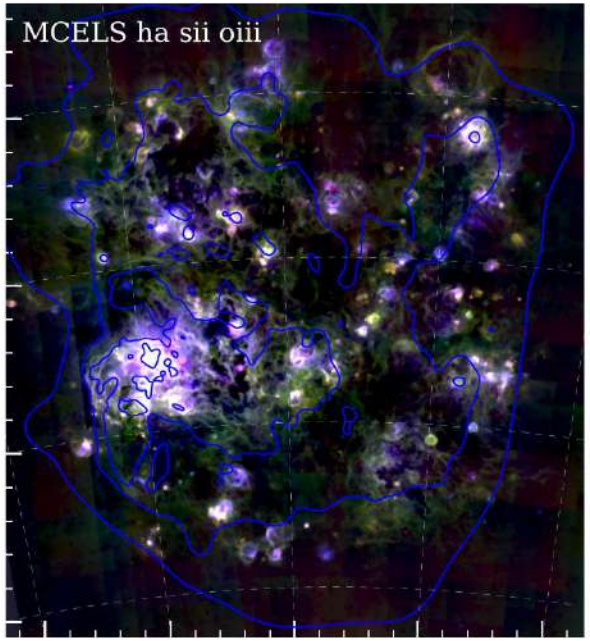
- Radio: Cosmic rays & HII regions
- HI: Cold gas (Fukui et al. 2017)
- Far/Mid IR: Dust
- Near IR: Stars
- Optical lines: HII regions & SNRs
- X-rays: Thin, hot plasma

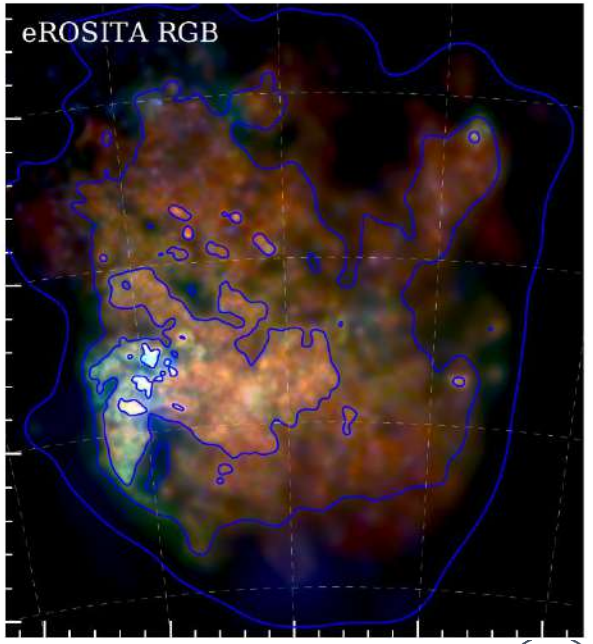


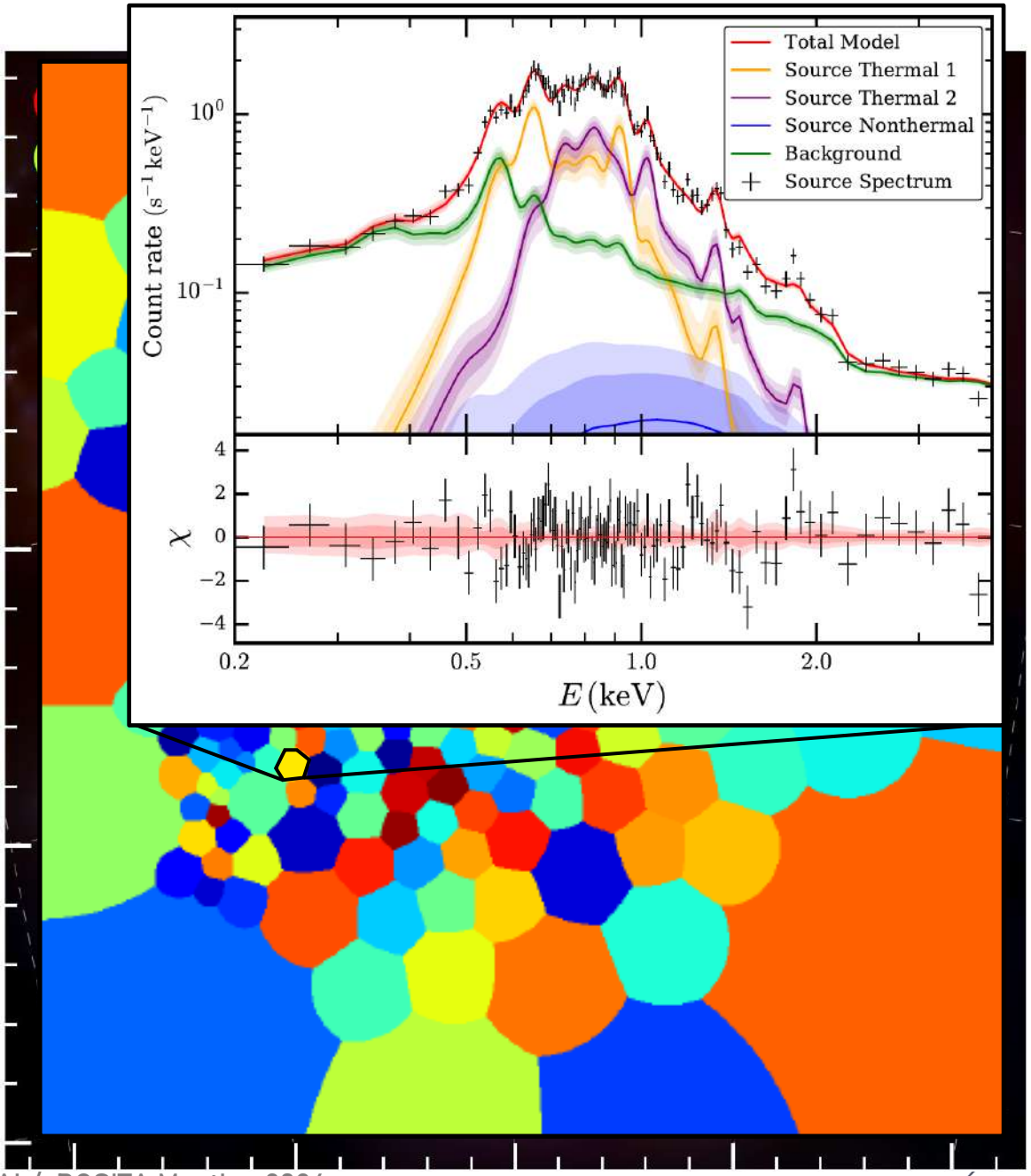



# Spectral analysis

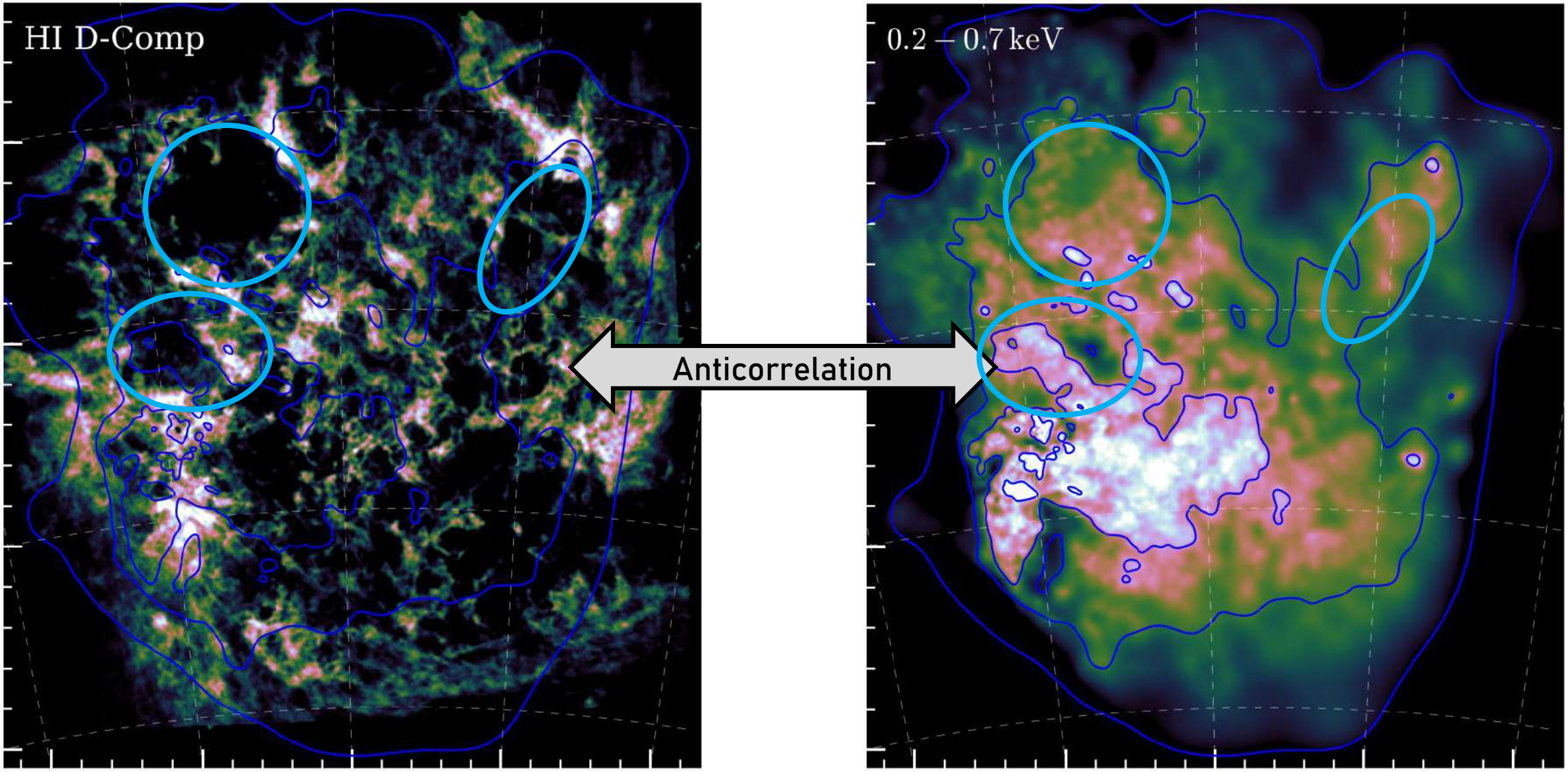
- Decompose into ~ 170 independent regions (S/N ~ 100 after background subtraction)

➢Spectral analysis: Constrain properties of

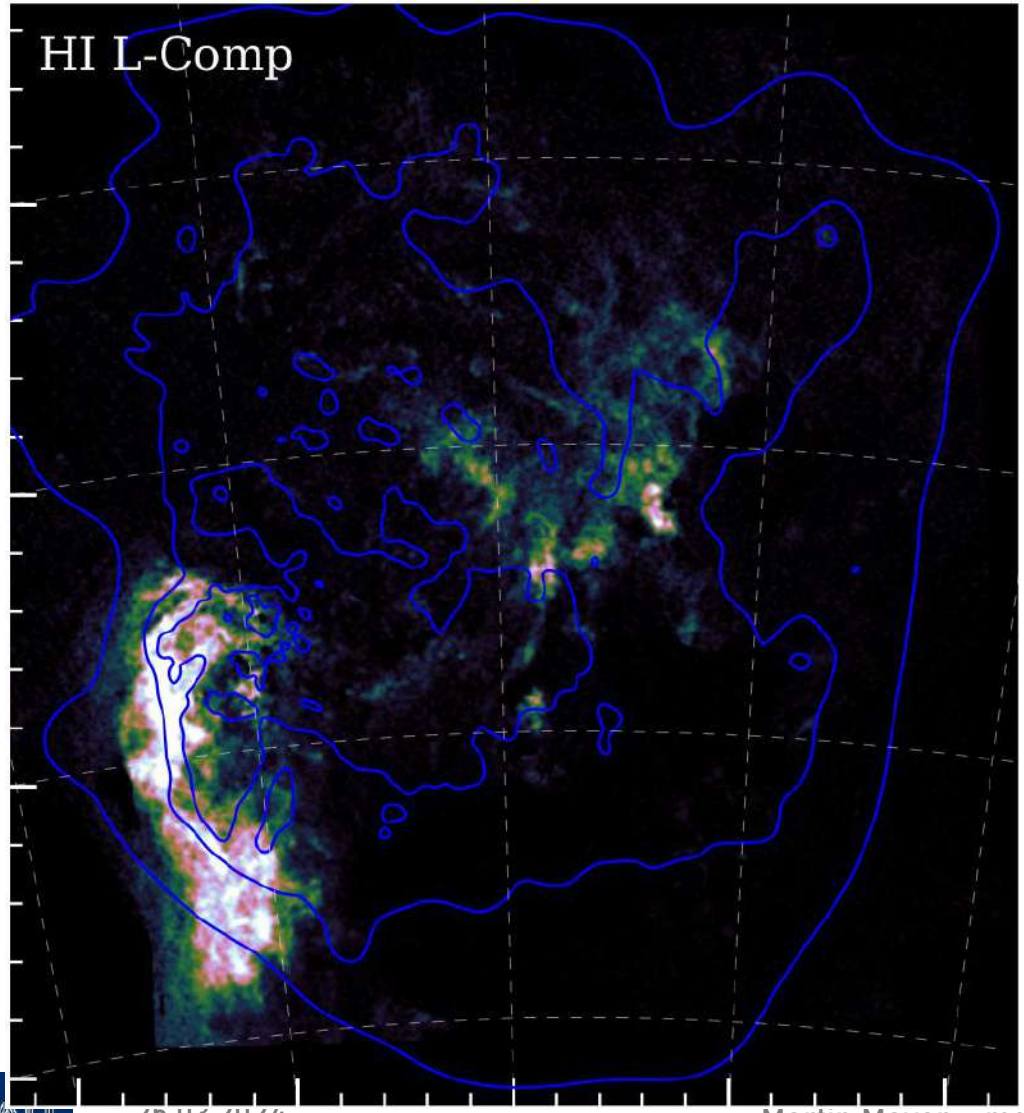
- X-ray Absorption (within LMC)
- Thermal components (temperature, emission measure, abundances, ...)
- (Possible) nonthermal components

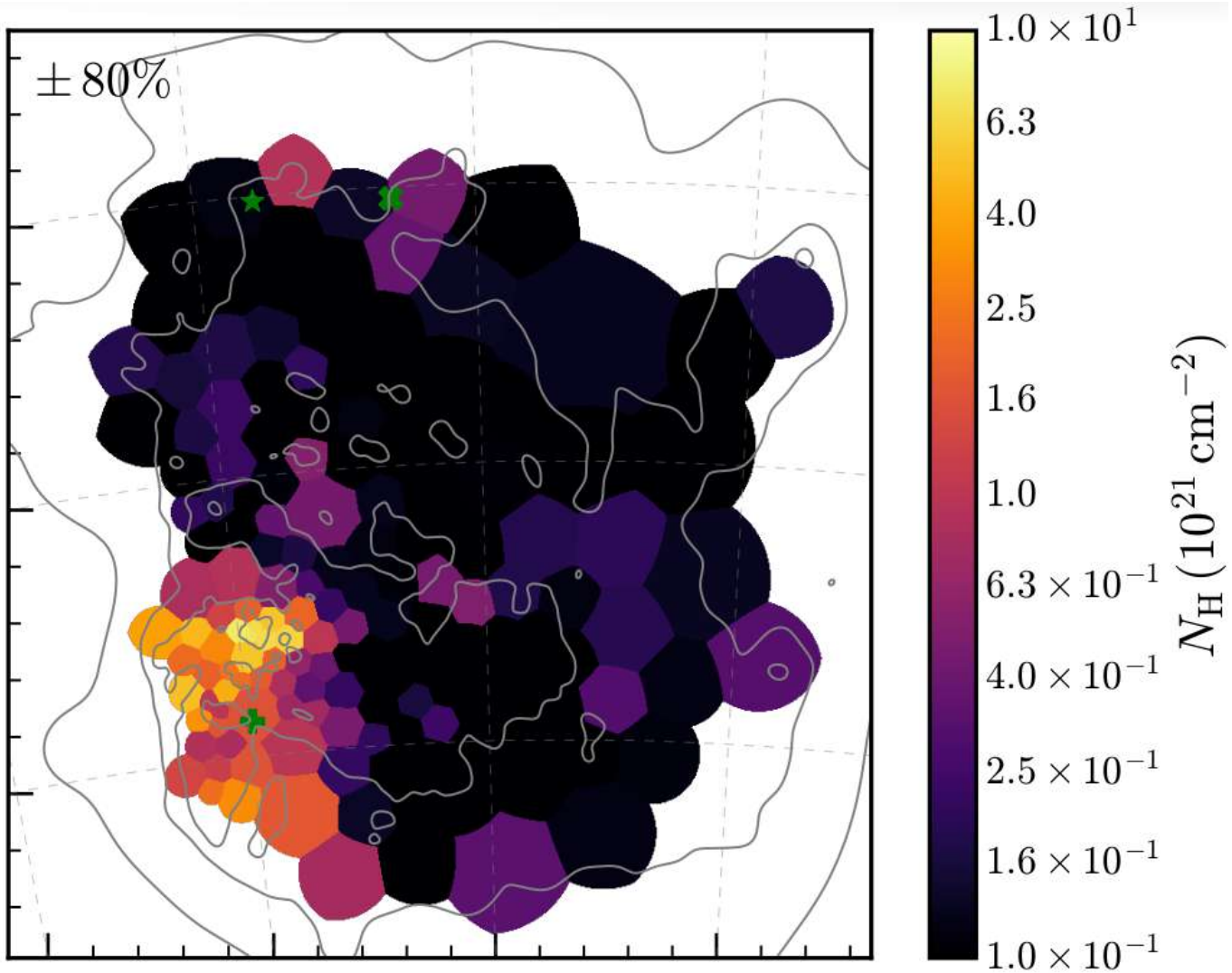


# X-ray Emission & Neutral Hydrogen

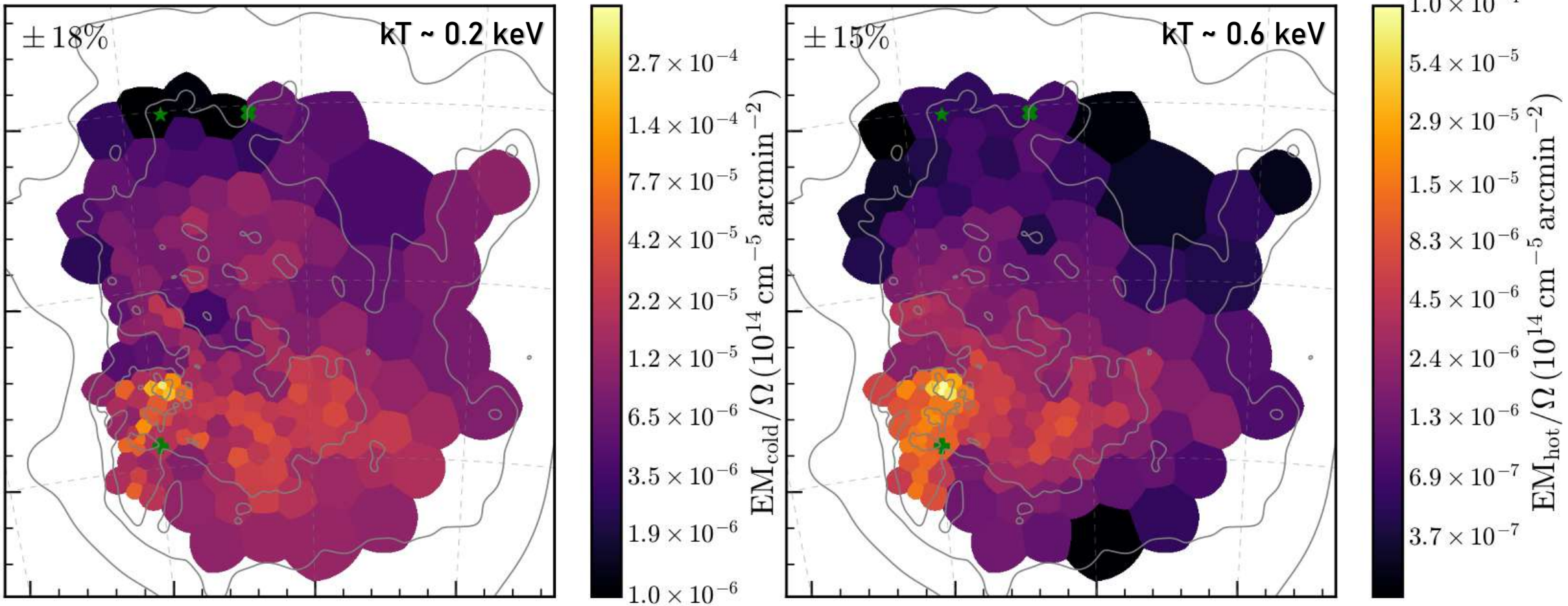


# X-ray Absorption & Neutral Hydrogen



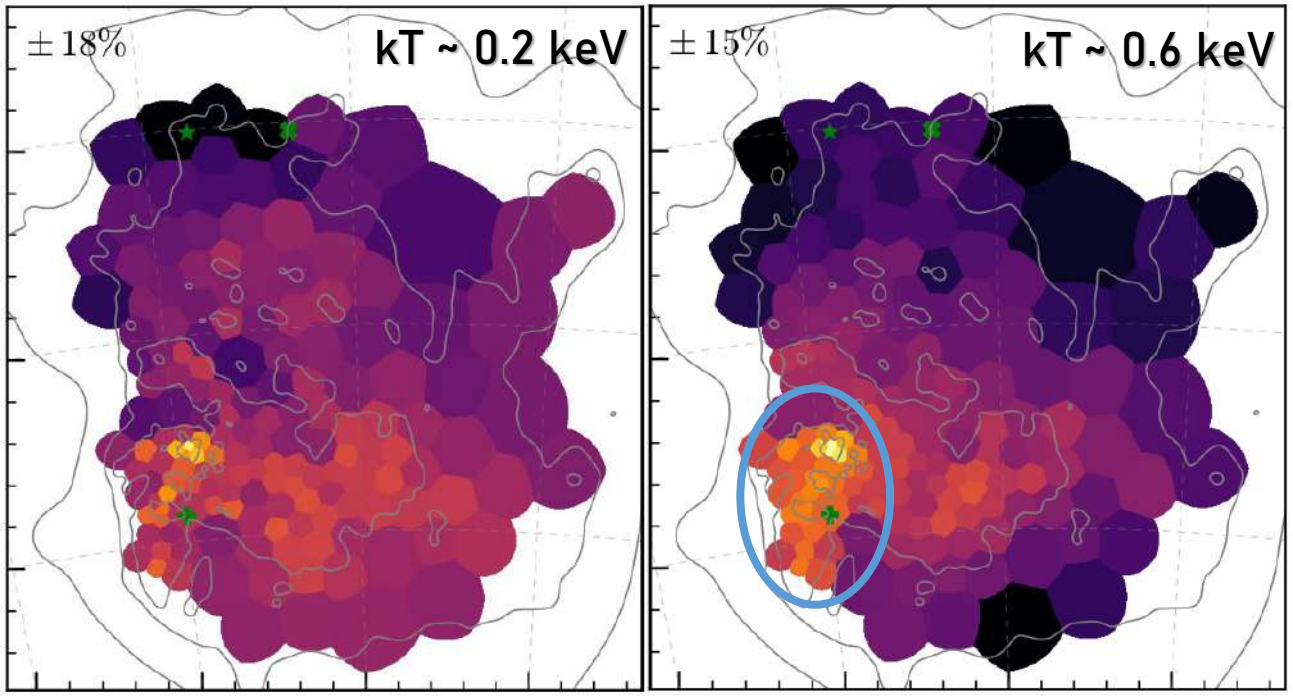
# Hot Plasma Temperature and Distribution

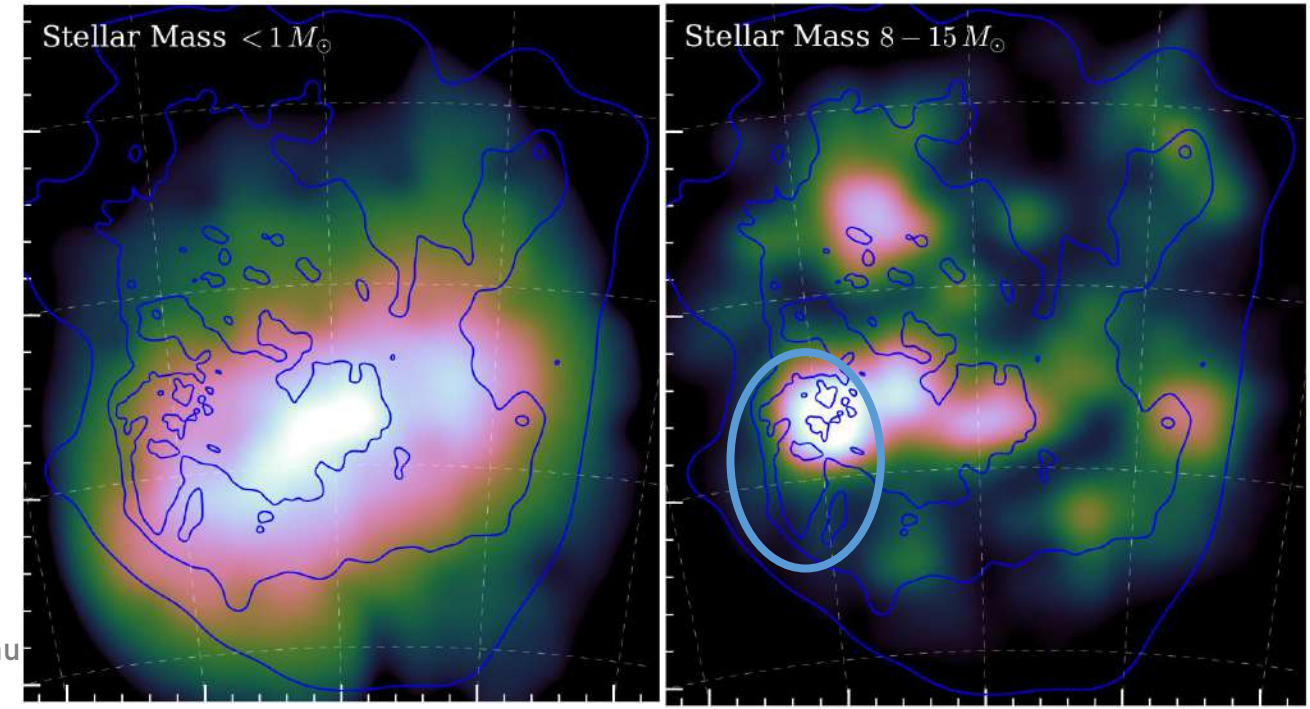


# Hot Plasma & Stellar Populations

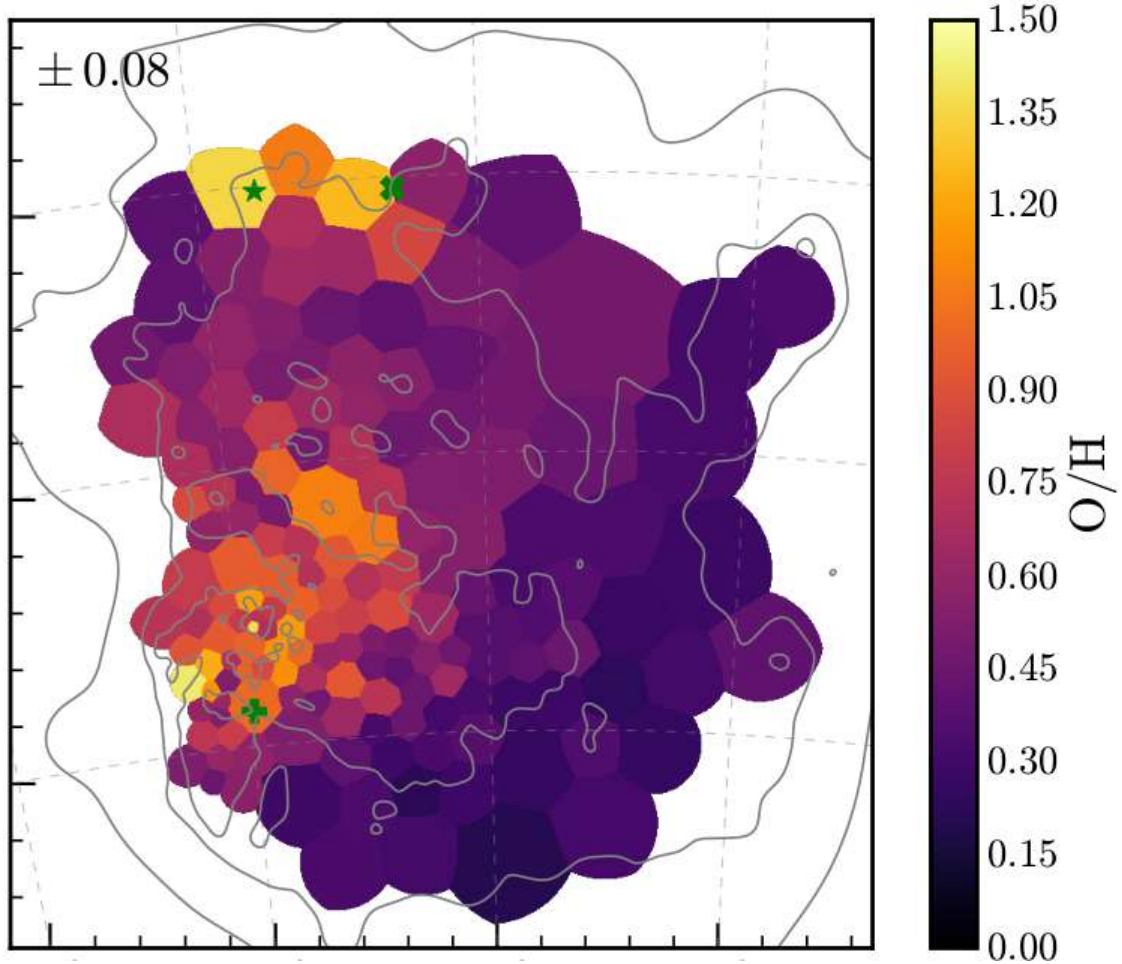
- Use LMC star formation histories (Mazzi et al. 2021) to estimate present day stellar mass distribution
  - ➢ Representative of distribution of X-ray emitting gas?

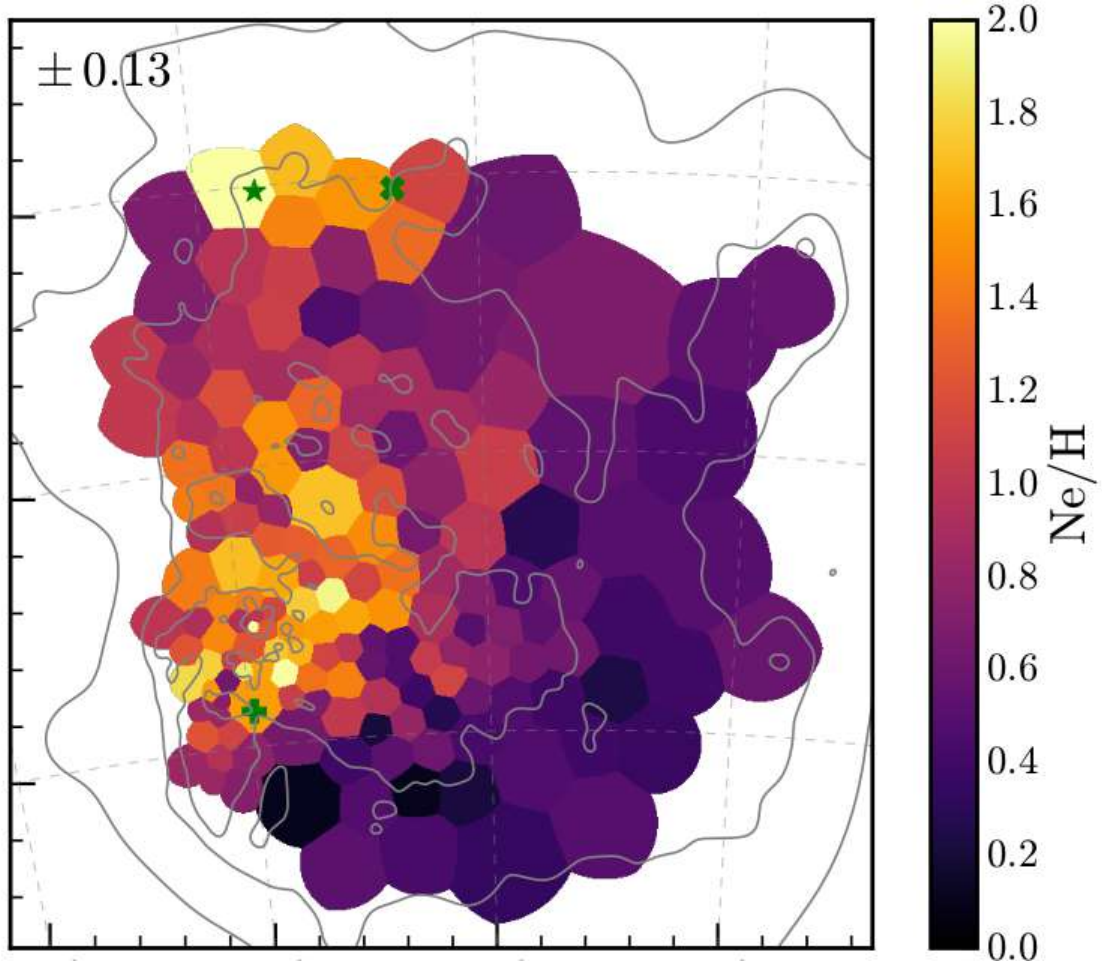
- Separate origin for X-ray spur needed since insufficient massive stellar population!
  - ➢ Collision between cold gas components? (Knies et al. 2021)



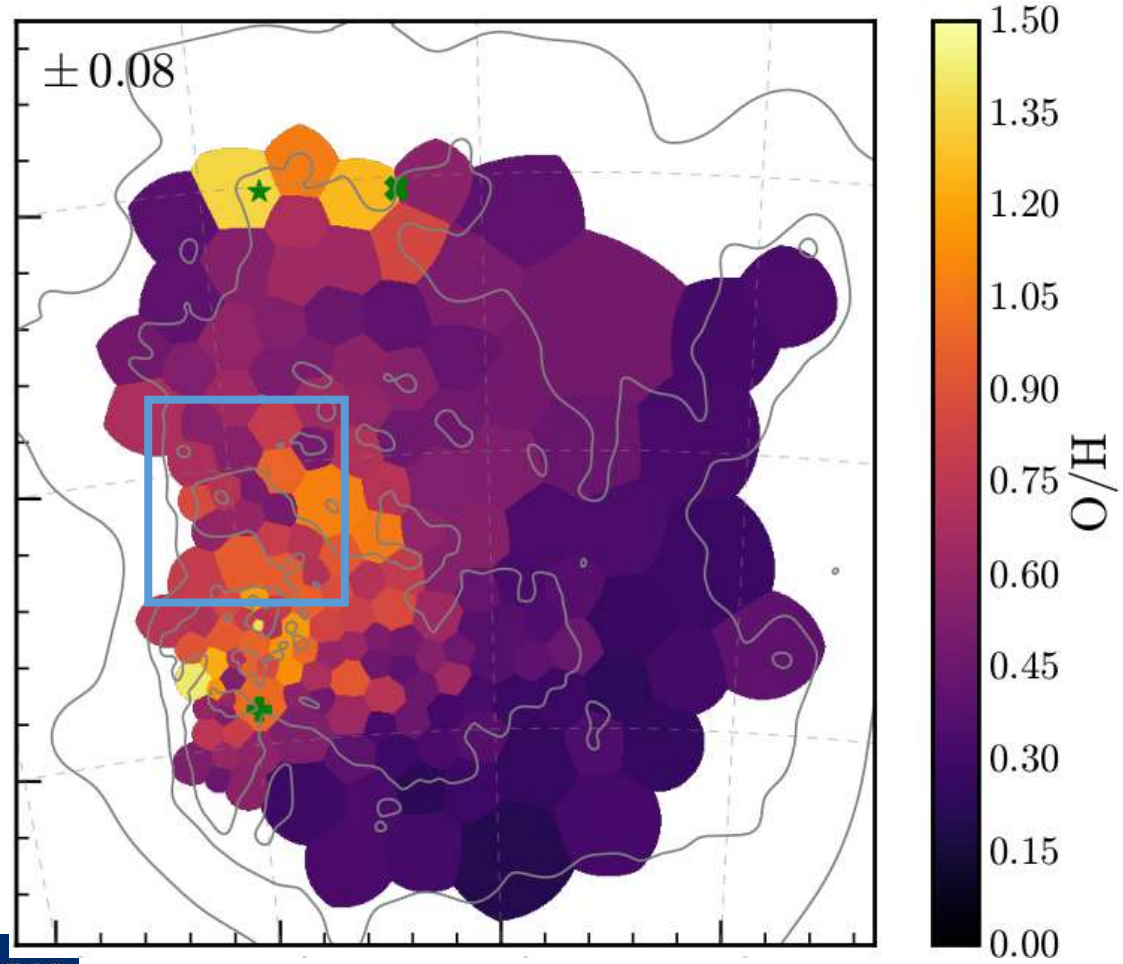



# Elemental Abundances



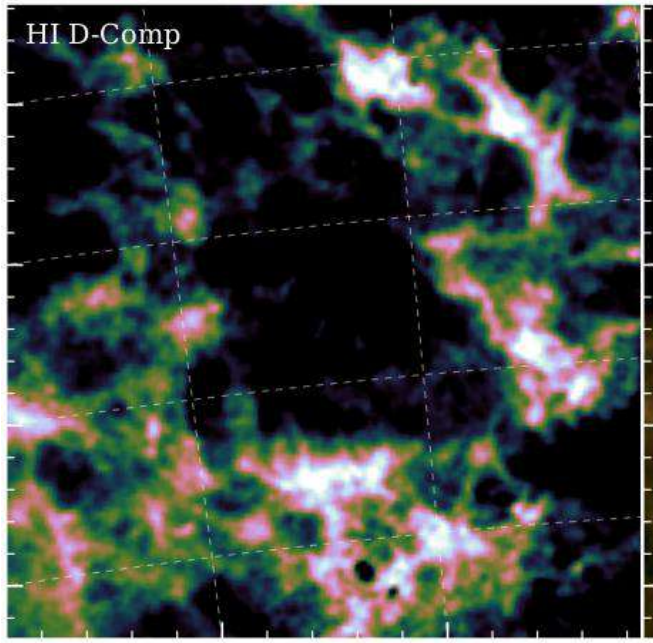



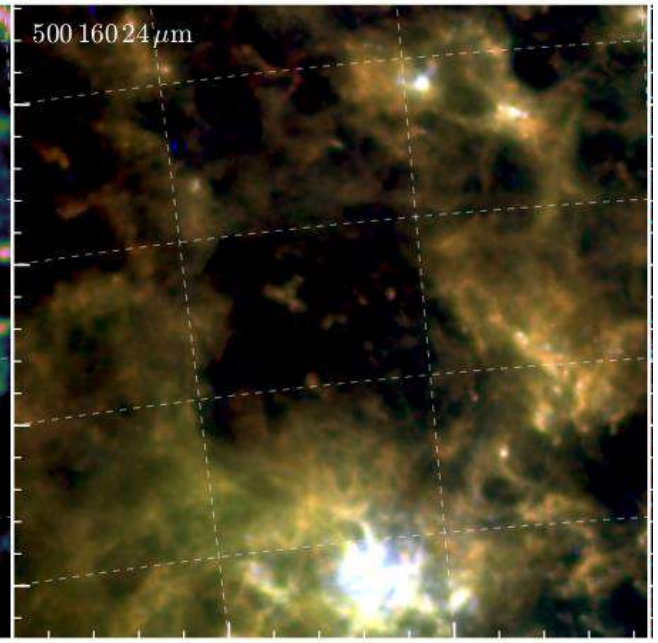
# Outflow signatures from star-forming region?

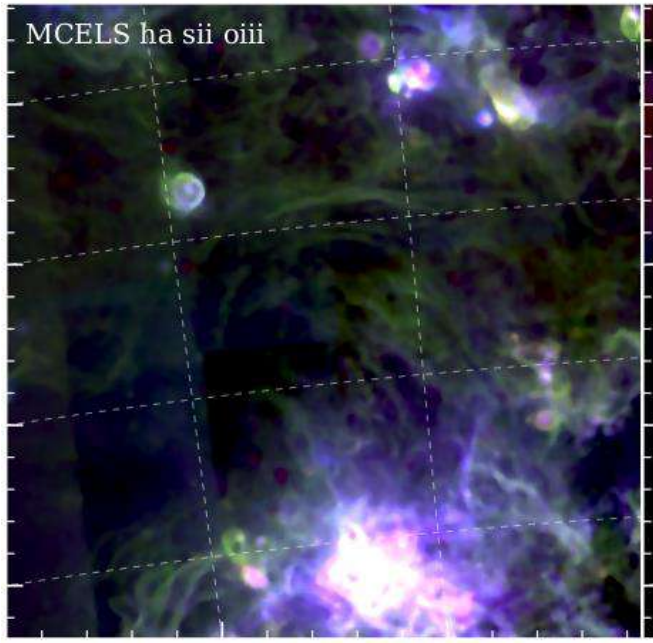


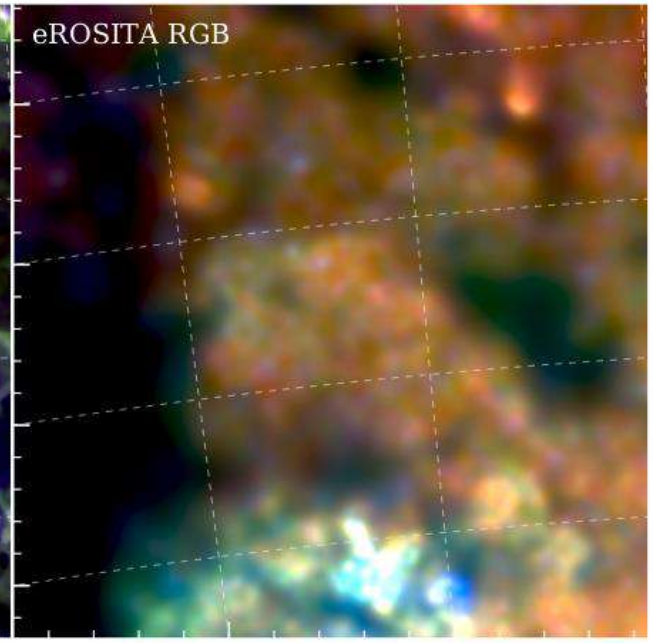




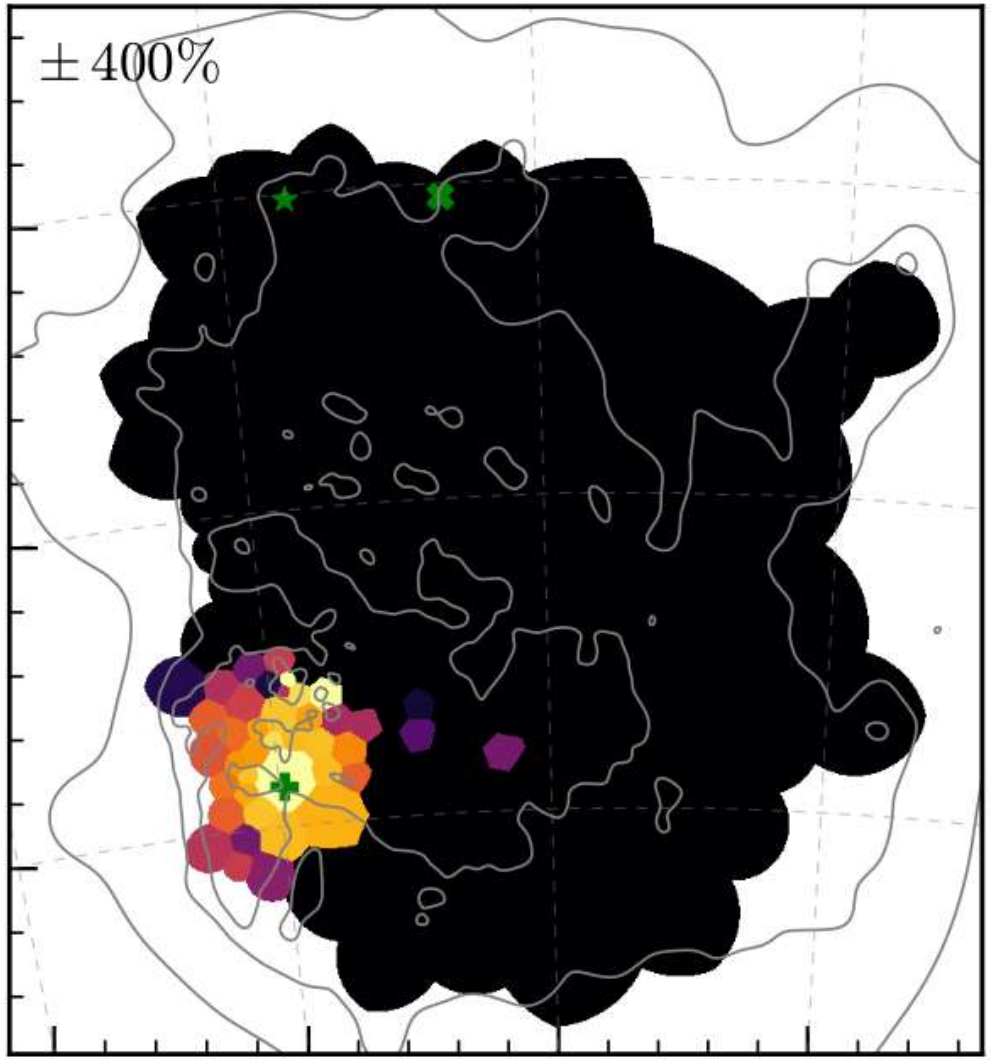


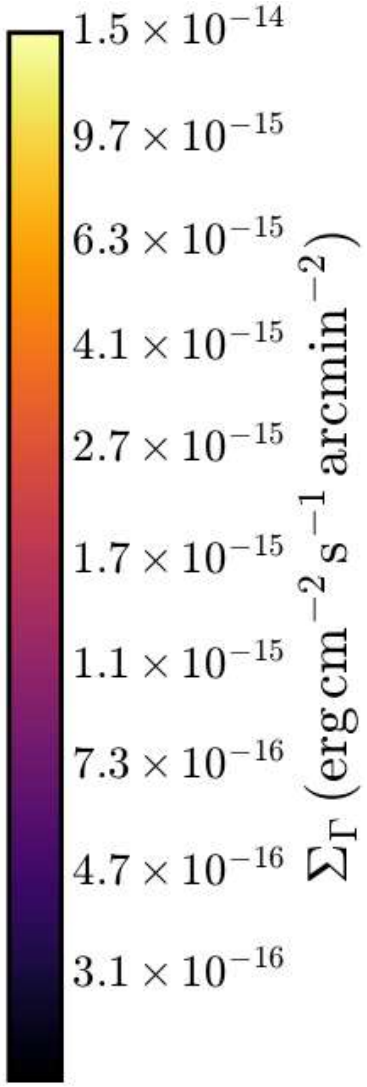



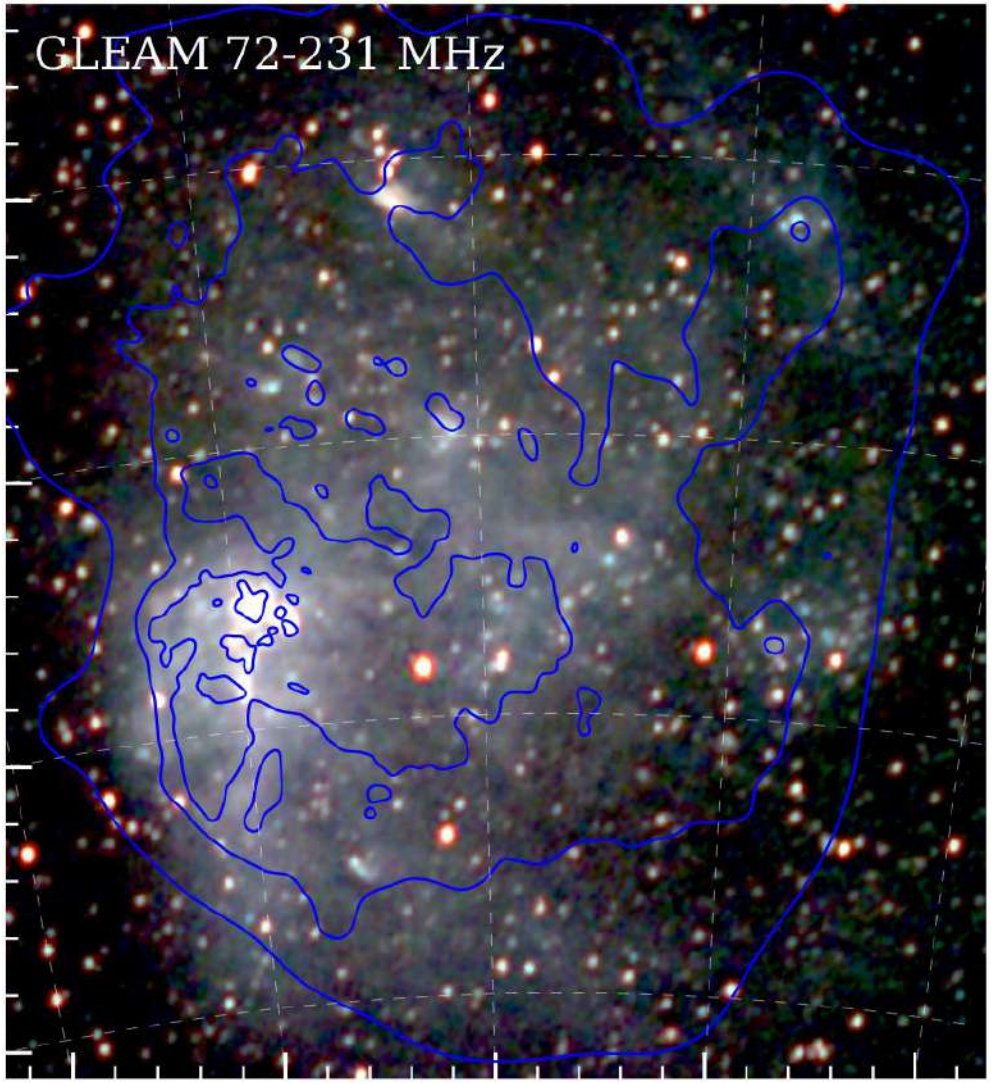



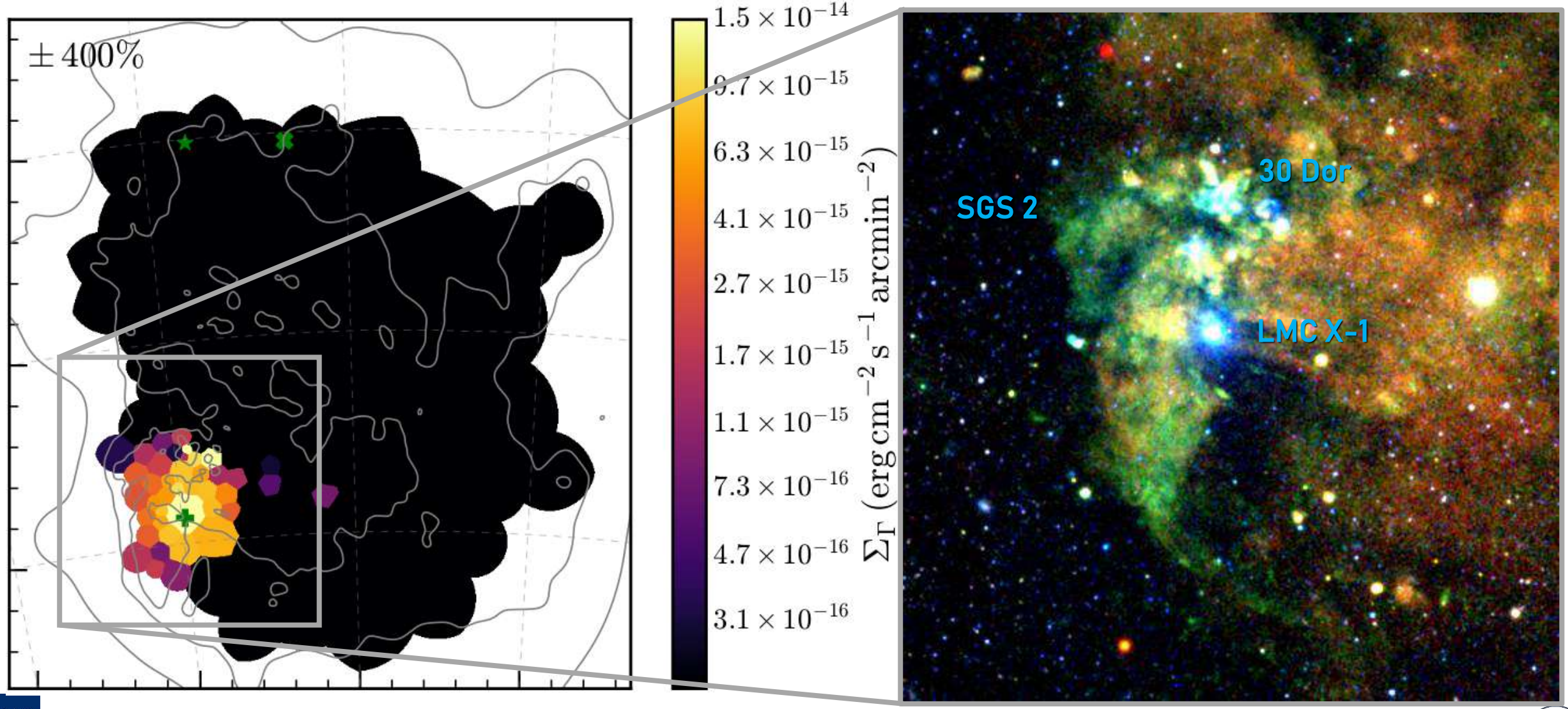
# Nonthermal X-rays: Diffusing cosmic rays?



# Nonthermal X-rays: Contamination by LMC X-1?



# Summary

Diffuse X-ray emission of LMC shows

- X-ray emission strongly anticorrelated with cold ISM component (HI & FIR)
- Hot plasma distribution not reproduced by stellar populations
- Evidence for outflows from star forming regions (abundances, opt. line emission, ...)
- Nonthermal X-ray emission in 30 Dor & (tentatively) SGS 2