background image: VISION (Meingast et al. 2016)

Gas absorption and dust extinction towards the Orion Nebula Cluster

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Motivation

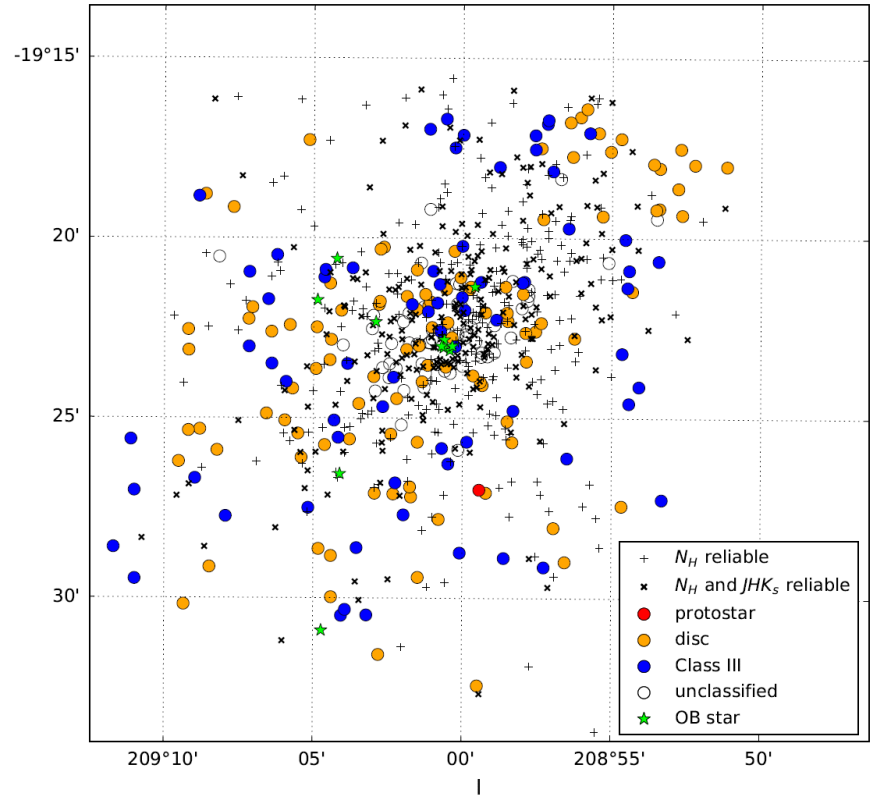
Target region	N_H/A_V [cm^{-2} mag^{-1}]	Reference
diffuse ISM	$2.2 \cdot 10^{21}$	Watson (2011)
	$1.8 \cdot 10^{21}$	Predehl & Schmitt (1995)
	$2.2 \cdot 10^{21}$	Gorenstein (1975)
	$2.2 \cdot 10^{21}$	Ryter et al. (1975)[b]
L1641	$0.8 \cdot 10^{21}$	Pillitteri et al. (2013)[c]
IRAS 20050+2720	$1.2 \cdot 10^{21}$	Günther et al. (2012)
NGC 1333	$1.0 \cdot 10^{21}$	Winston et al. (2010)
Serpens	$0.7 \cdot 10^{21}$	Winston et al. (2007)
ρ Oph	$1.5 \cdot 10^{21}$	Vuong et al. (2003)
RCW 38	$1.7 \cdot 10^{21}$	Winston et al. (2011)
RCW 108	$2.0 \cdot 10^{21}$	Wolk et al. (2008)
ONC	$1.4 \cdot 10^{21}$	this work

N_H … hydrogen column density

A_V … dust extinction

- A uniform N_H/A_V ratio ($2 \cdot 10^{21}$ cm^{-2} mag^{-1}) is found in the diffuse ISM throughout the sky.
- **Some star-forming regions have N_H/A_V ratios lower than the diffuse ISM, the literature gives differing explanations.**
- The ONC is a complex region, but is extensively studied: Numerous high-quality data sets provide an excellent basis for studies of the ISM.

Methods and data



X-ray absorption

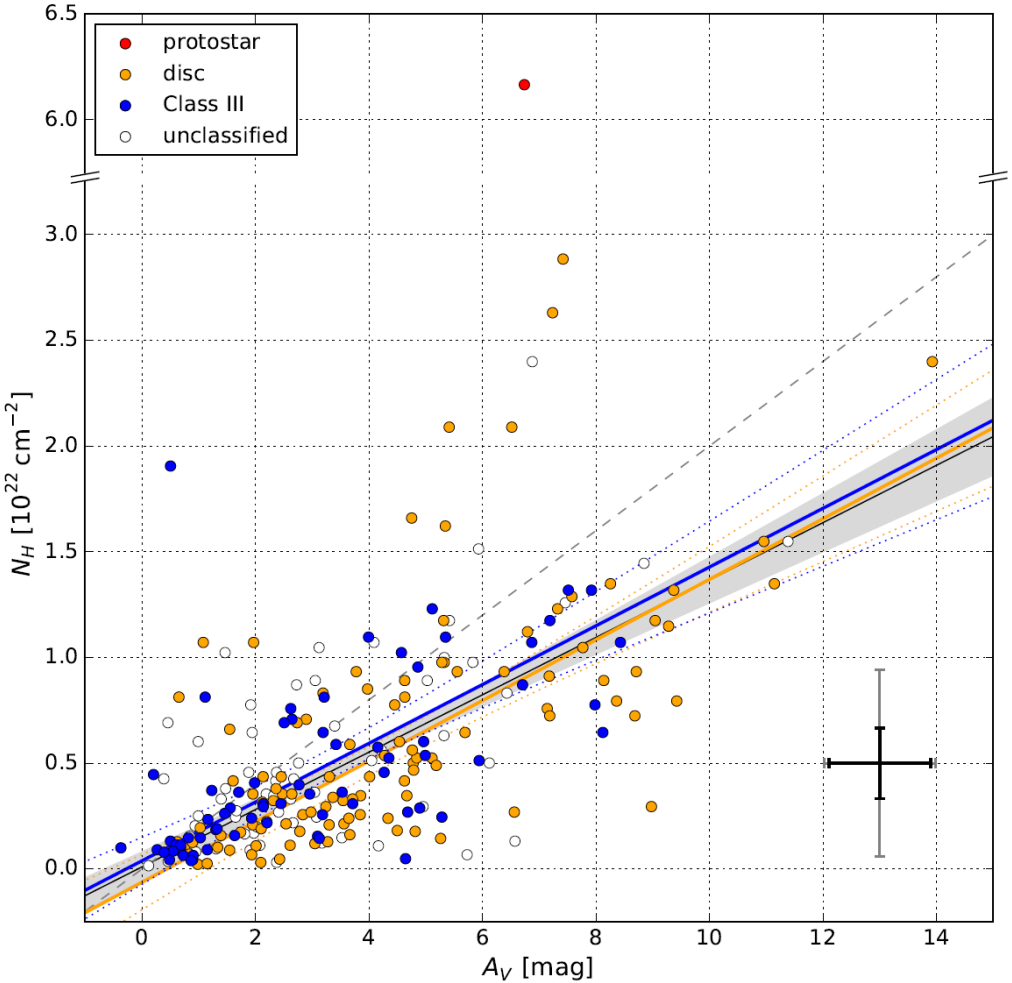
- Fits of X-ray spectra with model of emission and absorption
  → equivalent hydrogen column density N_H
- Chandra Orion Ultradeep Project (COUP, Getman et al. 2005)

NIR extinction

- Comparison of stars' observed and intrinsic NIR colour magnitudes (NICER algorithm, Lombardi & Alves 2001)
  → V-band extinction A_V
- VISTA Orion A survey (VISION, Meingast et al. 2016)

MIR magnitudes

- Classification of young stellar objects
- Spitzer Orion survey (Megeath et al. 2012)



Results

$\mathbf{N_H/A_V =}$
$\mathbf{(1.39 \pm 0.14) \cdot 10^{21}\ cm^{-2}\ mag^{-1}}$

Result is robust against…

- … variations in sample size.
- … a change to updated X-ray models.

Result is sensitive to…

- … changes in the extinction law (R_V).
- … changes in elemental abundance values.

Assuming solar abundances for ONC and the diffuse ISM → N_H/A_V in ONC is lower by 18 - 31%
(for R_V = 5.5 - 3.1).