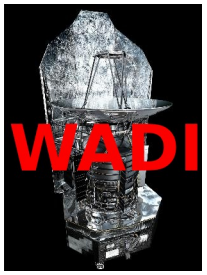
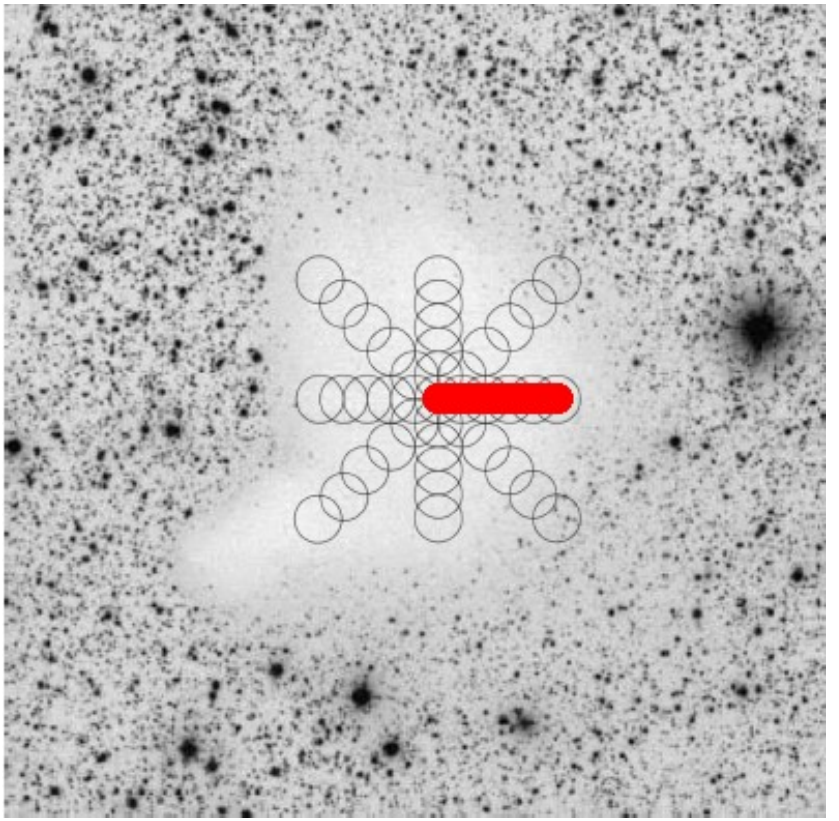
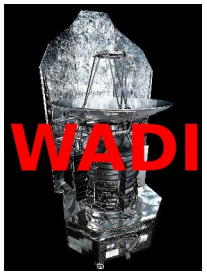


B68 observations

Low-UV reference

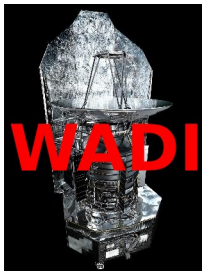


- only pointed long integrations
- at about center of the “red” cut, 3 integrations for [CII]
- 3 (types of) observations taken so far



B68 observations

OD	Target	RA	DEC	Proposal	AOT	Duration	Start time	Obs. Id	AOR Label
1051	B68-edge-1	17h22m34.100s	-23d49m46.00s	KPGT_vossenko_1	HifiPoint	2338	2012-03-30T20:26:13Z	1342242800	B68-point-edge-1900-CII - 0001
852	B68	17h22m37.100s	-23d49m46.00s	KPGT_vossenko_1	PacsLineSpec	15091	2011-09-13T06:29:23Z	1342228534	B68-weak
852	B68	17h22m37.100s	-23d49m46.00s	KPGT_vossenko_1	PacsLineSpec	3825	2011-09-13T05:23:25Z	1342228533	B68-strong
835	B68	17h22m37.100s	-23d49m46.00s	KPGT_vossenko_1	HifiPoint	8481	2011-08-26T17:42:45Z	1342227537	B68-point-0972-OH+-NH-H3O+ - resched - resched
681	B68	17h22m37.100s	-23d49m46.00s	KPGT_vossenko_1	HifiPoint	193	2011-03-26T21:04:47Z	1342216831	B68-point-0572-NH3-H2O
658	B68	17h22m37.100s	-23d49m46.00s	KPGT_vossenko_1	HifiPoint	8481	2011-03-02T18:28:43Z	1342214956	B68-point-0972-OH+-NH-H3O+ - resched
642	B68	17h22m37.100s	-23d49m46.00s	KPGT_vossenko_1	HifiPoint	4251	2011-02-14T15:43:28Z	1342214309	B68-point-0835-CH+
508	B68-main-1	17h22m35.600s	-23d49m46.00s	KPGT_vossenko_1	HifiPoint	745	2010-10-04T05:58:42Z	1342205795	B68-point-main-1900-CII
508	B68-edge-1	17h22m34.100s	-23d49m46.00s	KPGT_vossenko_1	HifiPoint	745	2010-10-04T05:44:05Z	1342205794	B68-point-edge-1900-CII
508	B68-1	17h22m37.100s	-23d49m46.00s	KPGT_vossenko_1	HifiPoint	745	2010-10-04T05:29:28Z	1342205793	B68-point-1900-CII
503	B68	17h22m37.100s	-23d49m46.00s	KPGT_vossenko_1	HifiPoint	527	2010-09-29T06:23:31Z	1342205292	B68-point-0536-CH
488	B68	17h22m37.100s	-23d49m46.00s	KPGT_vossenko_1	HifiPoint	7359	2010-09-14T01:45:21Z	1342204513	B68-point-0972-OH+-NH-H3O+



B68 observations

Results until last year:

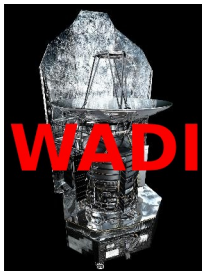
- Only non-detections:
  - CH, CH^+, H_3O^+, H_2O, OH^+, NH, NH_3, [CII]

2012:

- PACS search for strong lines:
  - Non-detections: CII, OI (63, 145μm), NII (122, 205μm), OH, HD

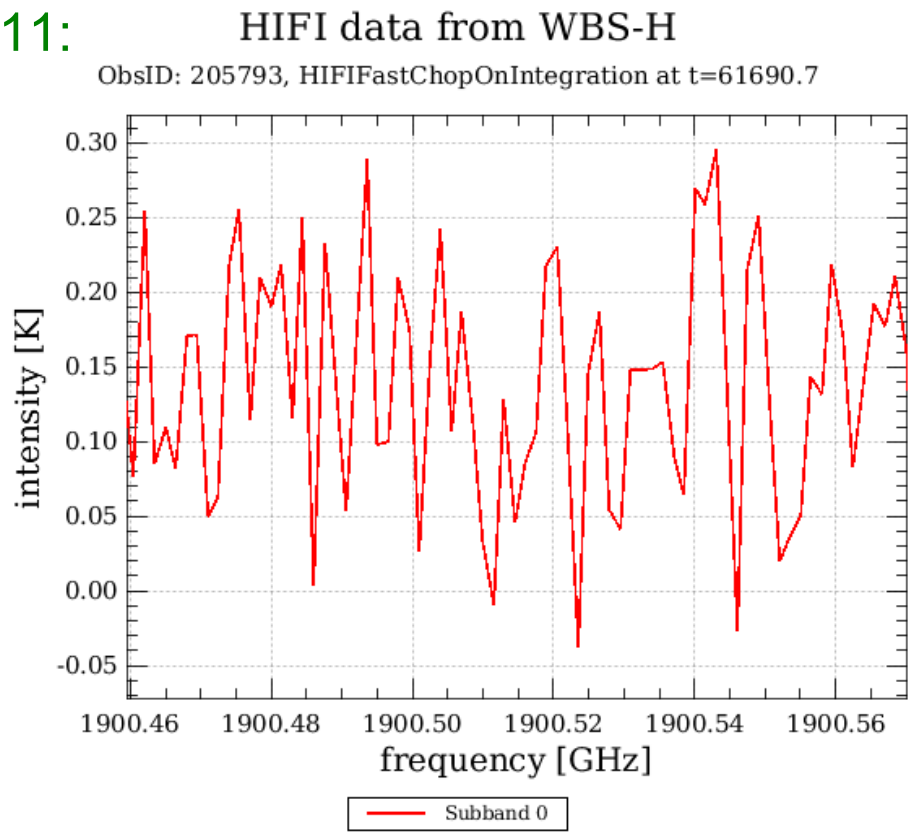
Follow up:

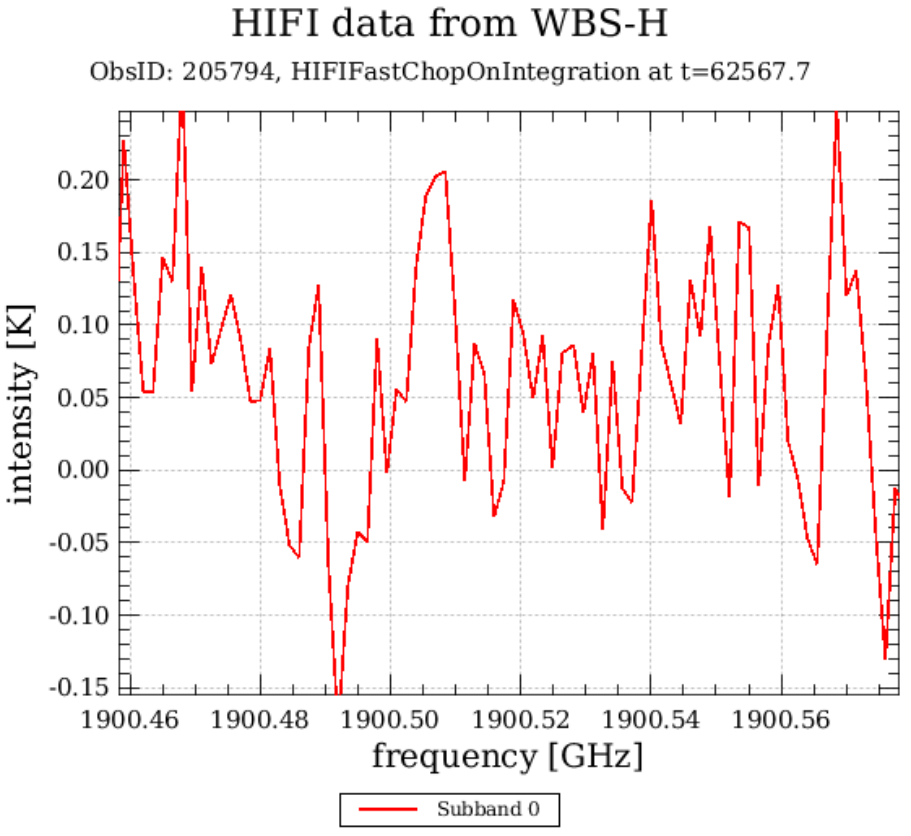
- Deep integration of CII at edge
  - Position with marginal detection in 2011



[CII] observations

2011:

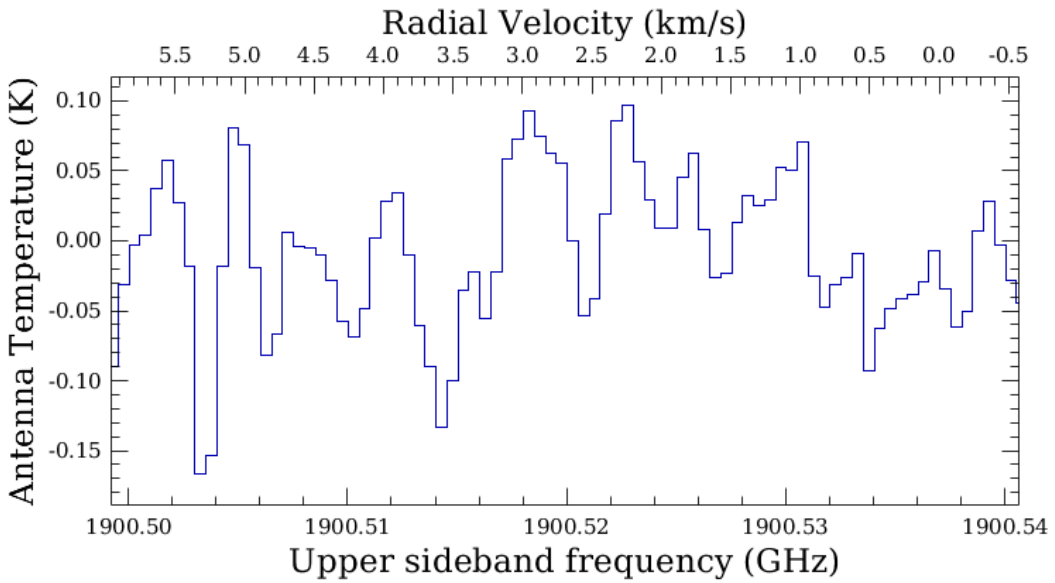


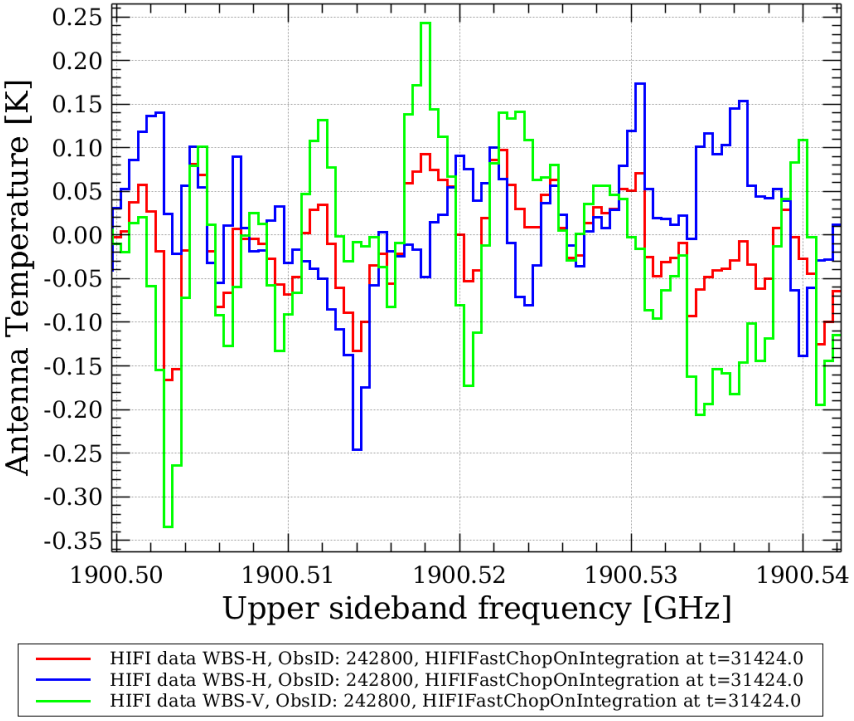


- no detection at core, tentative detection (150mK) in tangential ray

[CII] deep integration

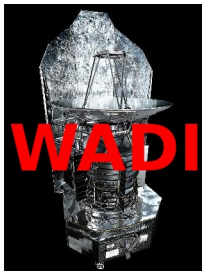
2012:





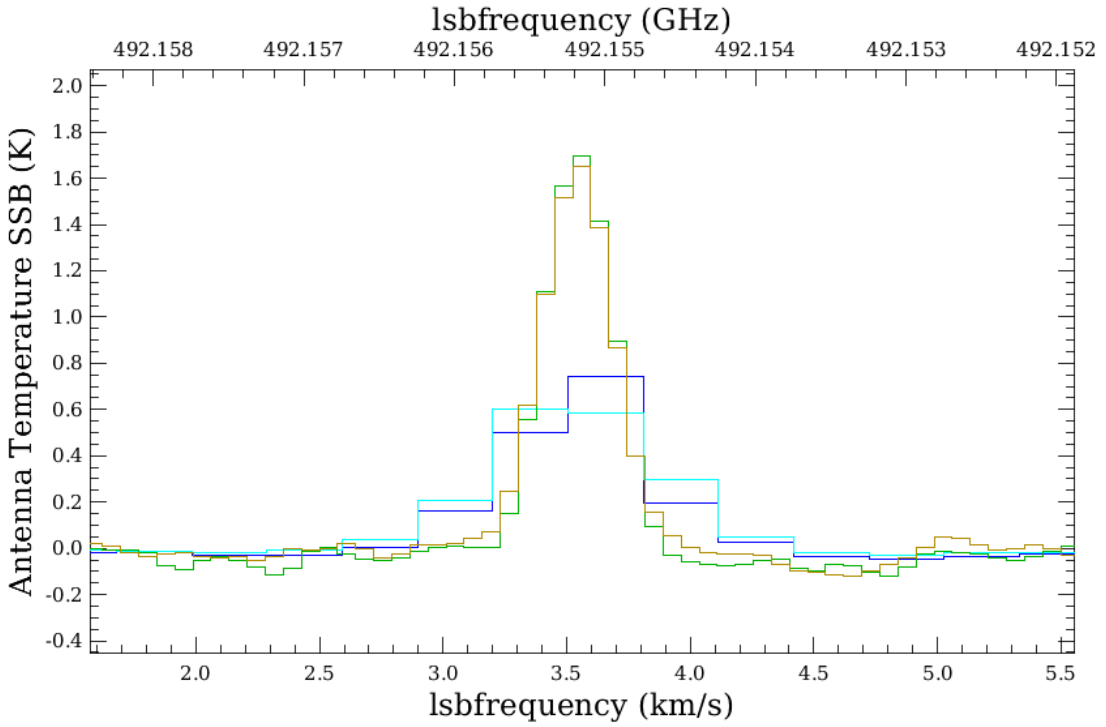
No signal in both polarizations

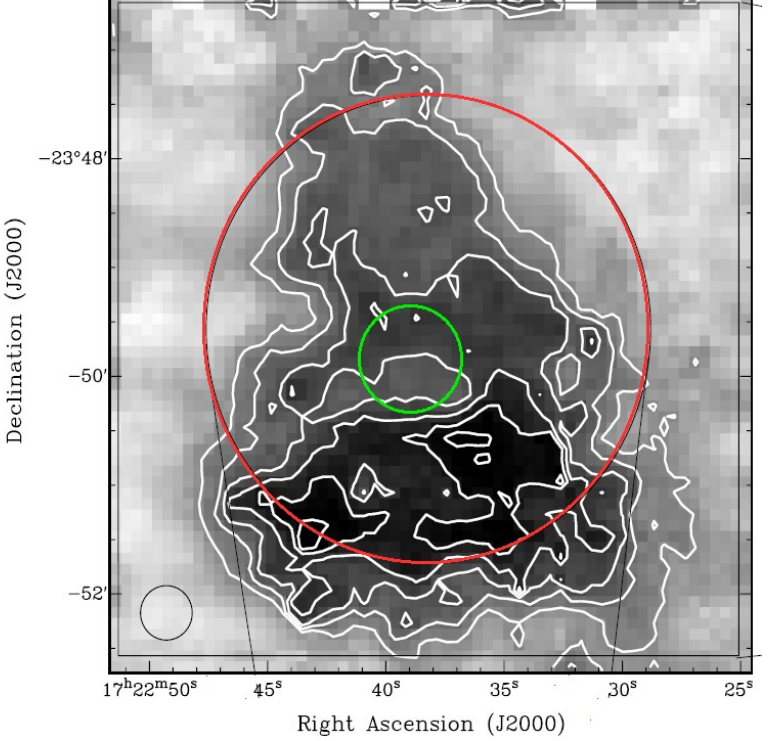
- Line expected at 3.5km/s
- Clear non-detection in tangential ray at level << 100mK

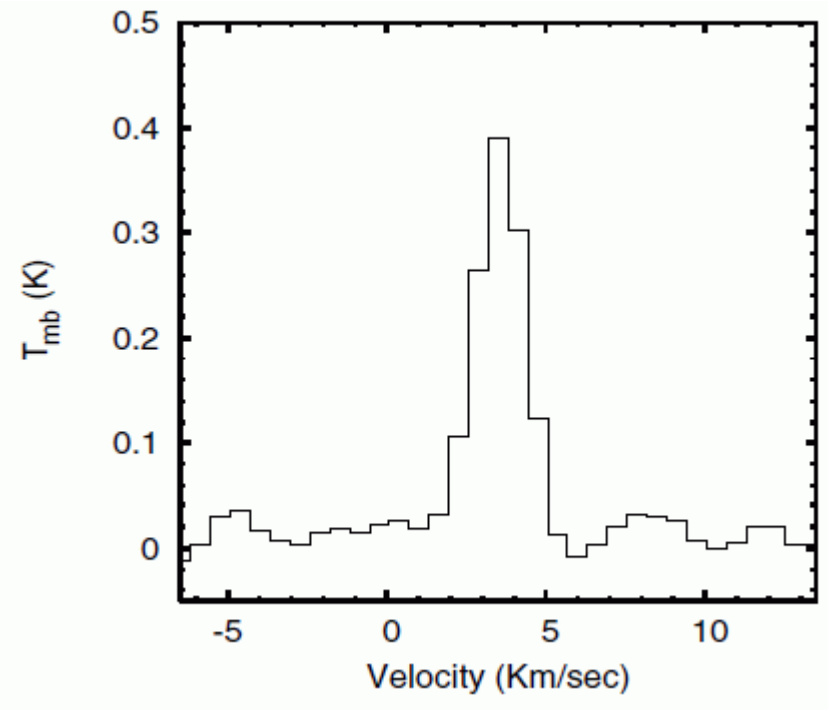


[CI]

[CI] in public calibration observation:

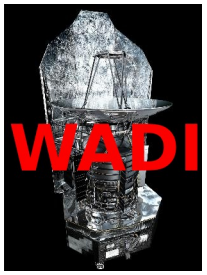






- Line very narrow (0.35km/s)
- Integrated line weaker than in SWAS observation (0.5 vs. 0.8 K km/s)

Compare to SWAS data: In 4.3' beam (Pineda & Bensch 2007)

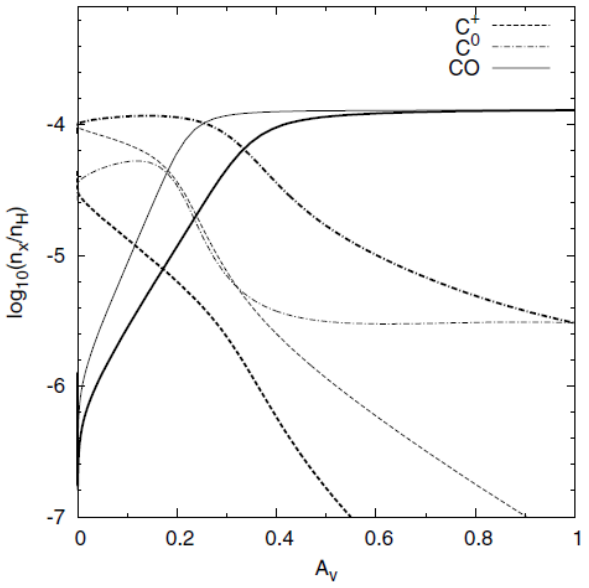


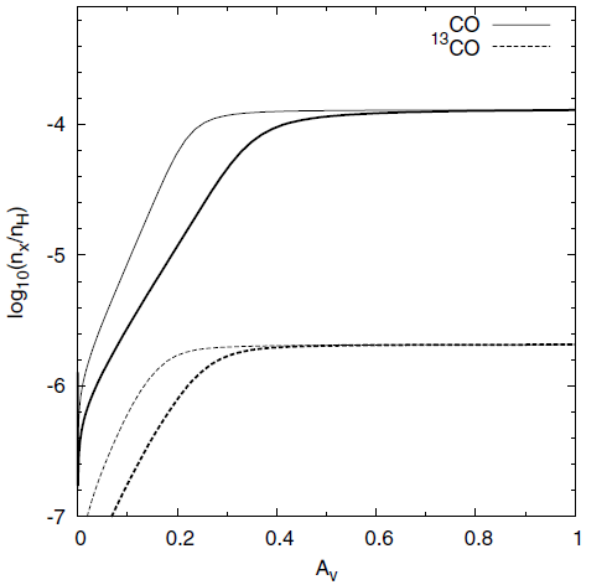
Comparison to models

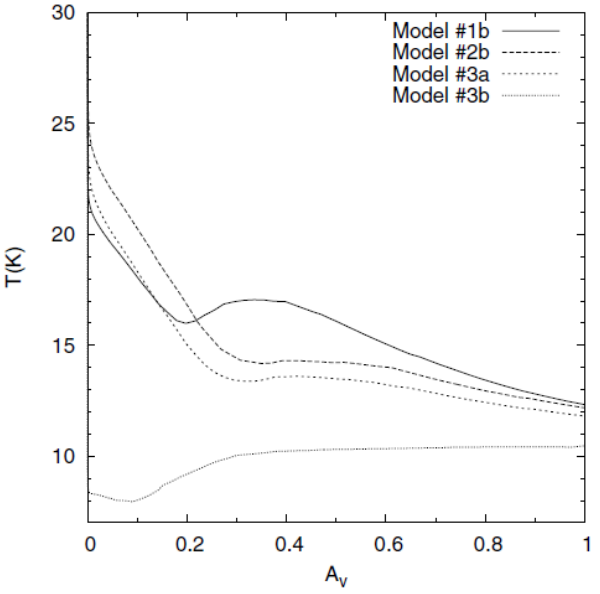
PDR model (Pineda & Bensch 2007):

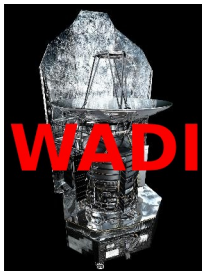
- Set up to fit SWAS [CI], CO, ^{13}CO 1-0 .. 3-2
- Very low UV flux
- Additional pre-shielding

Model #	FUV field χ_0	PAHs	Depletion
1a	1.0	N	N
1b	1.0	N	Y
2b	1.0	Y	Y
3a	0.75	Y	Y
3b	0.12	Y	Y









Comparison to models

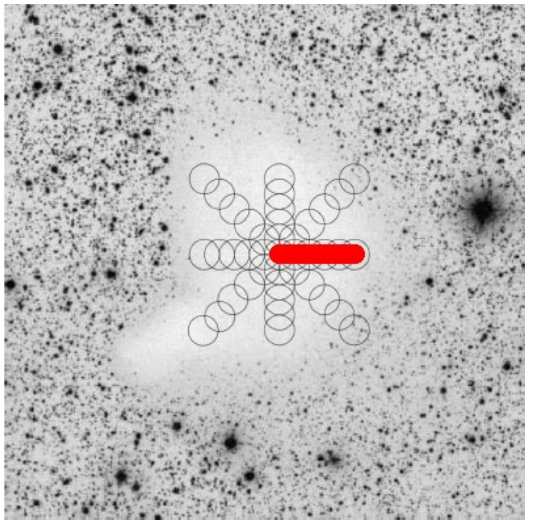
Predictions:

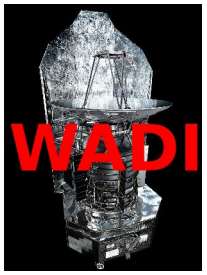
Predicted line-integrated intensities toward Barnard 68 center.

Species transition	Resolution - Instrument	Intensity (10^{-7} erg s^{-1} cm^{-2} sr^{-1})			
		Model #1a	Model #1b	Model #2b	Model #3a
[C II] $^2P_{3/2} \rightarrow ^2 P_{1/2}$	18″-GREAT-SOFIA	9.49	9.49	4.77	2.44
	13″-HIFI-Herschel	9.47	9.47	4.76	2.43
[C I] $^3P_2 \rightarrow ^3 P_1$	25″-NANTEN2	2.83	2.86	6.65	5.43
	25″-HIFI-Herschel				
	8″-APEX	2.83	2.86	6.62	5.40
^{12}CO $J = 5 \rightarrow 4$	39″-HIFI-Herschel	2.49	2.38	1.60	1.37
	56″-CASIMIR-SOFIA	2.51	2.39	1.61	1.37
^{12}CO $J = 4 \rightarrow 3$	13″-APEX	2.22	2.12	1.83	1.56
	45″-NANTEN2	2.23	2.13	1.84	1.56

- [CI]: 5 times weaker than in “warm” models
  - Cold model (#3b) excluded for bad fit
- [CII]: just below the prediction of weakest (warm) model

→ All models excluded!





But

Dust:

- PACS/SPIRE maps require hotter globule than previous models predicted!

Nielbock et al. (2012)