Notes

Thomas & Roberto::

- Look at shapes, number of knots, velocity structure of outflows in W43 MM2, MM3
- Lines:
    - CO and SiO
- Science case:
    - Constrain episodic accretion
    - Measure timescale between knots
    - Impact of environment on the outflows (and outflow populations)
- From Thomas' past work:
    - in W43-MM1, 42 out of the 46 outflow lobes (i.e., 91%) are detected both in CO(2–1) and SiO(5–4)
    - Higher than elsewhere in the literature
- Thomas will start working on imaging 12CO (C18O) in W43-MM1/2
    - Will inform data reduction team how to handle these lines

Allison & Adam:

- Identify outflows in SiO only
    - By eye approach: draw 3D selection
    - Simple morphological statistics (shape, direction)
    - Make PPV masks to enable future analysis
- Distinguish clearly-outflow material from not-clearly-outflow cloud material
    - Determine energy budgets of said categories if possible, i.e., how much energy is in actual outflows and how much in "ambient" (?) turbulence
- Present catalog of PPV selection of "high-confidence" and "low-confidence" outflows
- Link outflow catalog to their source "cores"
- Thomas will verify (and use) catalog in W43-MM1/2/3 fields
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Timea & Sylvain:

- Automated detection approach
- Tested on CO 2-1 in W43-MM1
- Goal to identify protostellar vs prestellar cores
- Search linked to individual protostars
    - Use gext2d
    - Search for line-wing excess
    - Method explored so far is line-wing excess in aperture-subtracted spectra
        - Will show method in more detail at an upcoming kinematics WG
- Masters student (maybe continue as PhD) to arrive in March.

- Aim is in part to have a systematic way to assess where outflows are; for a complete sample
- Wants:
    - SiO cubes
    - 12CO cubes
    - 13CS for core rest velocities

Tapas :

- Detection of SiO and CO outflows by eye approach
    - -> will use other projects' catalogs
- Use N2H+ for identification of cold filaments
- A statistical study on the orientation of cold filaments and outflows
- Assign the outflows to the host cores
- Compare the outflow parameters (e.g., outflow mass, outflow momentum, dynamical time-scale, etc) with the core parameters (e.g., mass)
- Estimation of energy budgets of outflows to examine the self-regulation of star formation

Antoine & Fabien:
shocks and cloud formation using SiO and CO lines and grids of the Paris-Durham model.

Bibliography related to SiO outflows [Antoine, to be completed]:

Models of SiO chemistry in shocks:

Schilke et al. 1997 AA 321 293
Caselli et al. 1997 AA 322 296
Gusdorf et al. 2008a, b AA 482 809 & AA 490 695
Guillet et al. 2009 AA 497 145
Anderl et al. 2013 AA 556 69
Louvet et al. 2016 AA 595 122 (W43-MM1), & in prep.

SiO observations in low-velocity shocks:

Jimenez Serra et al. 2010 MNRAS 406 187
Csengeri et al. 2011 ApJ 740 5
Nguyen Luong et al. 2011 AA 529 41
Nguyen Luong et al. 2013 ApJ 775 88
Sanhueza et al. 2013 ApJ 773 123
Duarte-Cabral et al. 2014 AA 570 1
Louvet et al. 2016 AA 595 122

SiO observations in outflows:

Nisini et al. 2007 (low-mass L1157, L1448, bullets analysis) AA 462 163
Gusdorf et al. 2011 (low-mass, BHR71, bullet analysis) AA 532 53
Leurini et al. 2013 (high-mass IRAS 17233-3606) AA 554 35

Leurini et al. 2014 (high-mass, survey, on-source) AA 570 49
Louvet et al. 2016 AA 595 122

Outflow energetics and relationship with protostellar evolution:
Bontemps et al. 1996 (rather low-mass) AA 311 858
Beuther et al. 2002 (high-mass) AA 383 892
Duarte-Cabral, Bontemps et al. 2013, AA 558, 125 (high-mass)
Leurini et al. 2015 (high-mass) AA 584 70

Outflow samples:
Plunkett et al. 2015, Nature 527 70
Nony et al. 2020 AA 636 38