RECIPES FOR BROWNIES 2009

Discussion Session:

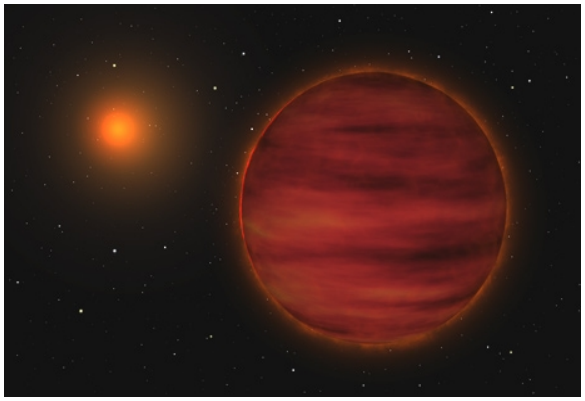
- Different predictions from the BD formation

- What observers need/can do to help sort out the mode(s) of BD formation

- How to incorporate/accommodate observations into theory

- Better cooperation/interaction between theoreticians and observers

- Creation of guidelines on future strategies to adopt



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A starter:

- Can we use cluster spatial structure and IMFs to probe formation models and dynamical evolution? (*P. Clark*; BD diaspora in older clusters – *J. Bouvier);* is it "Universal", is it reliable?; theorists need to resort more to empirical IMFs to compare their models/simulations
- In addition to upcoming 30-40m class telescopes and JWST (examples of what we need):
    - **All-Sky, synoptic, deep IR surveys** (deeper multi-epoch 2MASS analogue, include narrow-band filters): now VISTA...down the road SASIR(?) (LSST IR counterpart) → understand BD variability (rotation? Pulsation? Activity? - *A. Cody*), proper motions and parallaxes
    - **Very Large Area multi-object optical-red/near-IR spectroscopic surveys** (multi-fiber spectrograph on dedicated 8m class telescope) → get spectra/Vrad/abundances for large samples *(spectra are crucial – K. Luhman, A. Burgasser, Glover)*

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A starter:

- BD Disk properties/evolution will require larger Spitzer successor: imaging + spectroscopic capabilities

- Various contending BD formation hypothesis *(e.g. M. Bate et al., P. Padoan, A. Whitworth & Stamatellos*): probably several occur at the same time, depending on spatial scale or environment. It is ever more clear that binaries are a key test to formation models → need to improve observational constraints: statistics of wide binaries (in young regions and in field),
  → probe smaller separation range, also over ample age range (extended AO surveys in young/old clusters, space telescopes HST/JWST)

- ALMA/Herschel (others) will probe into prot-BD stage *(L. Testi*)

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Discussion: *(comments by C.Briceño in small italics)*

•**S. Goodwin:** need also binary dwarf statistics -> **A.Burgasser, K. Luhman:** we already have good archives with those data.

• **A. Burgasser:** how can we help other observers and theoreticians to make existing databases and data archives more useful?

• **P. Padoan:** it would be extremely useful for theoreticians to have at hand information/data archives on the spatial distribution of young, low-mass stars *(i.e. good membership lists/censa of nearby Star Forming Regions (SFR)/OB associations)*

• **M. Bate:** a problem encountered when comparing models with empirical IMFs, is that these keep changing all the time. A SRF archive would be great! (membership lists updated regularly, SEDs, etc).

• **A. Natta:** a great idea, but its a huge amount of work (impossible), because data has not only to be collected, but quality-controlled *(others in the audience, including me, did not think it an impossible task)*

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Discussion (cont.): *(comments by C.Briceño in small italics)*

- **E. Cody:** I think its pretty useful.
- **P. Padoan:** get funding and it can be done
- **M. Bate:** need one place to look up things (at least for regions like Taurus)...some single place in which all the observational data is compiled. We also need some online version or equivalent of the Handbook of Star Forming Regions (B. Reipurth, ed.). Such an effort needs to be taken seriously: funded, acknowledged
- **S. Goodwin:** we could start doing this ourselves using Wikis
- **P. Hennebelle:** remember there is the Virtual Observatory (VO), which means that for this effort to be useful it should be done within the VO framework
- J. Bouvier: an Open Cluster database (OC) already exists (the one mantained by Mermilliod). Maybe we can incorporate younger regions to it, and take advantage of the existing infrastructure in the OC database. I agree that in any event, a database of young regions should be VO-compliant

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Discussion (cont.): *(comments by C.Briceño in small italics)*

- **V. Jôergens:** its probably a good idea to ask the exoplanet people to add BDs to their lists
- **S. Goodwin:** are the binary populations “Universal” from one SFR to another? *(this bears upon whether formation scenarios depend on environment)*
- **M. Bate:** very wide binary BDs are going to be useful to discriminate among different formation scenarios
- **S. Goodwin:** are wide binaries formed but then disrupted as a SFR evolves?