

# Astro 2020 White Paper Coordination for IR SIG

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# Astro 2020 White Paper Call

- White Papers ***should focus on science (not missions/projects)*** and identify which of the following thematic area it covers:
  - Planetary Systems
  - Star and Planet Formation
  - Star and Stellar Evolution
  - Formation and Evolution of Compact Objects
  - Resolved Stellar Populations and their Environments
  - Galaxy Evolution
  - Cosmology and Fundamental Physics
  - Multi-Messenger Astronomy
- Total Length: 5 pages (incl. figures/tables; refs/author list does not count)
  - MS Word template available; only PDF accepted
- Due Tuesday February 19, 2019

# Current Resources For Coordination

- IR SIG Google Doc:
  - Coordination of IR-focused WPs for each DS2020 science theme
  - [https://docs.google.com/document/d/1e-BP\\_vuETprlCn161nUwMInKvOCUqtQfTfV7\\_dZaqZQ/edit#](https://docs.google.com/document/d/1e-BP_vuETprlCn161nUwMInKvOCUqtQfTfV7_dZaqZQ/edit#)
- DS2020 White Paper Coordination Website (NRAO/ngVLA):
  - encourage WP coordination across the multi-wavelength community
  - <https://sites.google.com/view/astro2020-wps/home>
- Astroslack2020:
  - Forum for discussing ideas... gossiping.

# Current List of Multi-Discipline/Wavelength WPs (I)

Title	Lead Author	DS2020 Science Theme
The Star Formation History of the Universe	Eric Murphy	Galaxy Evolution
How Do Cold Gas Outflows Shape Galaxies?	Alberto Bolatto	Galaxy Evolution
How, When, and Where do Planets Form	Andrea Isella	Star and Planet Formation
Magnetic Fields of Extrasolar Planets: Planetary Interiors and Habitability	Joseph Lazio	Planetary Systems
Fast Radio Bursts, Superluminous Supernovae and Gamma Ray Bursts as Signatures of Magnetar Birth	Casey Law	Formation and evolution of compact objects, Multi-Messenger Astronomy and Astrophysics
Nearby Galaxy Science Cases for LUNAR	Benne W. Holwerda	Resolved stellar populations and their environments, Galaxy Evolution
Cosmology with a Space-Based Gravitational Wave Observatory	Robert Caldwell	Cosmology and Fundamental Physics
Planet formation -- the case for ground based submm observations and large efforts on the computational side.	Wladimir Lyra	Planetary Systems, Star and Planet formation
Galactic Star Formation	Roberta Paladini	Planetary Systems, Star and Planet formation
Radio Signatures of Short GRBs and Binary NS Mergers in the Multi-messenger Era.	Alessandra Corsi & Nicole Lloyd-Ronning	Multi-Messenger Astronomy and Astrophysics
Observational Astrochemistry in the Next Decade	Anthony Remijan	Star and Planet formation
Intermediate-Mass Black Holes in Extragalactic Globular Clusters	Joan Wrobel	Formation and evolution of compact objects, Multi-Messenger Astronomy and Astrophysics
Star-forming filaments and cores in molecular clouds	Rachel Friesen	Star and Planet formation
Potential for Solar System Science with the ngVLA: the Giant Planets	Imke de Pater	Planetary Systems
Micro-arcsecond Astrometry	Mark Reid	Star and Planet formation, Stars and Stellar Evolution, Formation and evolution of compact objects, Galaxy Evolution, Cosmology and Fundamental Physics, Multi-Messenger Astronomy and Astrophysics
The Next Generation Celestial Reference Frame	Megan Johnson	Planetary Systems, Star and Planet formation, Stars and Stellar Evolution, Formation and evolution of compact objects, Resolved stellar populations and their environments, Galaxy Evolution, Cosmology and Fundamental Physics, Multi-Messenger Astronomy and Astrophysics
Measuring Physical Conditions in the Cold Gas of Nearby Galaxies	Probably Adam Leroy	Star and Planet formation, Galaxy Evolution
Understanding Massive Star Formation through Maser Imaging	Todd Hunter	Star and Planet formation
Observing the Effects of Chemistry on Exoplanets and Planet Formation	Brett A. McGuire	Planetary Systems, Star and Planet formation

 IR-Related WP

**Note: See WP summary/abstracts included in table on website for more details**

# Current List of Multi-Discipline/Wavelength WPs (II)

Title	Lead Author	DS2020 Science Theme
Prebiotic Molecules	Brett A. McGuire	Star and Planet formation
Imaging Evolved Stars at Radio Wavelengths	Lynn D. Matthews	Stars and Stellar Evolution
Astrophysics Away From Earth	Michael Zemcov	Planetary Systems, Galaxy Evolution, Cosmology and Fundamental Physics, Multi-Messenger Astronomy and Astrophysics
The evolution of the cosmic molecular gas density through cosmic times	Fabian Walter	Galaxy Evolution
Shocks in Novae	Laura Chomiuk	Stars and Stellar Evolution
Populations of BH and NS binaries	Tom Maccarone	Stars and Stellar Evolution, Formation and evolution of compact objects
X-ray binary jets	Tom Maccarone	Formation and evolution of compact objects
Life Cycle of Dust with the OST	Sarah Sadavoy	Star and Planet formation, Stars and Stellar Evolution, Galaxy Evolution
Science and Synergies with Wide-Field High-Resolution AO in the North	John Blakeslee	Star and Planet formation, Stars and Stellar Evolution, Resolved stellar populations and their environments, Galaxy Evolution, Multi-Messenger Astronomy and Astrophysics
Early evolution of galaxies and of large-scale structure from CMB experiments	Gianfranco De Zotti	Galaxy Evolution, Cosmology and Fundamental Physics
Solar System Satellites	Katherine de Kleer	Planetary Systems
Magnetic Fields and Turbulence	Hull et al.	Star and Planet Formation
Protostellar Variability	Fisher et al.	Star and Planet Formation
H <sub>2</sub> Mapping in Local Dwarfs	Sandstrom et al.	Star and Planet Formation
Regulating the Multi-Phase ISM	Heyer et al.	Star and Planet Formation; Galaxy Evolution
Evolved AGB Stars	Delvire De Beck	Star and Planet Formation; Stars and Stellar Evolution
FIR Roadmap for PP Disks	Pontoppidan & Cleaves	Star and Planet Formation
Cosmic Ray Flux in MW and Nearby Galaxies	Neufeld & Gerin	Resolved Stellar Population and their environments
Obscured AGN	Aalto et al.	Galaxy Evolution
HD Mapping in the MW and Nearby Galaxies	??	Star and Planet Formation
Molecular Chemistry as a Tracer for Present/Past High-Energy Activity in the GC	??	Star and Planet Formation
Dust Formation in Pair Instability SNe	??	Star and Planet Formation
Structure and Star Formation in the GC	??	Star and Planet Formation

 IR-Related WP     No Lead

**Note: See WP summary/abstracts included in table on website for more details**

# Planned IR WPs by DS2020 Theme

- Theme 1: Planetary Systems – *None?*
- Theme 2: Star and Planet Formation – 5+
- Theme 3: Star and Stellar Evolution – 1+
- Theme 4: Formation and Evolution of Compact Objects – *None?*
- Theme 5: Resolved Stellar Populations and their Environments – 3+
- Theme 6: Galaxy Evolution – 2+
- Theme 7: Cosmology and Fundamental Physics – *None?*
- Theme 8: Multi-Messenger Astronomy and Astrophysics – *None?*

# Summary & Suggested Strategy

- Look at existing WP list (read descriptions) and:
  - Contact lead authors and volunteer to help.
  - Some topics listed still vague -- Flesh out/Sharpen up ASAP.
  - Fill in gaps by leading a new WP.
- Start Writing
  - Setup overleaf/google doc/etc. and start fleshing out WPs.
  - Split WPs up if science is too broad.
- Stick to Concise Science Topics
  - Where possible, demonstrate why long-wavelengths (radio/mm/IR) observations enable and/or greatly enhance the the science topic.
- Point out synergies to make the most compelling case
  - E.g., Large population studies (OST) + high-resolution follow-up (ALMA/ngVLA)

"Overview of the Decadal Process & How (Not to) Write a White Paper", *L. Hillenbrand 2018*

AstroData 2020s workshop at IPAC in Dec. 2018

[https://meeting.ipac.caltech.edu/astrodata2020s/system/media\\_files/binaries/18/original/hillenbrand\\_astro20XX.pdf?1544766354](https://meeting.ipac.caltech.edu/astrodata2020s/system/media_files/binaries/18/original/hillenbrand_astro20XX.pdf?1544766354)



# What makes a Good White Paper?

- Addresses the call
- Understands and respects the intended audience
- Gives sufficient but not too much background
- Identifies critical questions and specific opportunities
- Makes a point that needs to be made
- Is clear and succinct
- Backs up claims and assertions with evidence
- Contains easily interpretable graphics / tables
- Is presented in a broad-minded fashion

# What makes a Less Effective White Paper?

- Poorly written / organized / conceived.
- Narrow-minded advocacy without consideration of the bigger picture.
- Repetitive of other white papers in an unnatural or inorganic way (i.e. looks like stuffing the ballot box).
- Blatantly exceeds the page or font guidance.

# What Impact Do WPs Really Have?

- Inform Astro2020 participants coming with different backgrounds and varying expertise, in a uniform manner
- Influence panel/committee discussions and decisions
- Buttress arguments arrived at independently
- Good graphics/tables could be used in the reports
- Legacy value in recording state of the field circa 2020