



January 28, 2014

**A Project Planning Meeting on Transit Observing with JWST:
A 3 Day Meeting on Science Drivers, Instrument Capabilities,
Observation Modes, and Data Reduction Challenges**

Hosted at Caltech by the NIRCam Instrument Team

March 11-13, 2014

Meeting is by Invitation Only

Colleagues,

I hope you are recovering from a New Year's Eve spent in pleasant revelry and ready to face the exciting challenges of 2014. This note is meant to bring you up to date on plans for the JWST Transit Workshop to be held on March 11-13. A list of participants and initial agenda are attached.

We are very close to the 45 person limit for the venue in the Keith Spalding building on the Caltech campus, so we cannot accommodate any additional participants, but I believe we have almost all the scientific, technical, and operational bases covered. In the agenda you will see a couple topics with no speakers yet assigned to them. I have sent out a few additional invitations to fill these lacunae, but I am also open to volunteers to fill them. In addition, the lunch breaks include time for people not yet talking to present a brief discussion of work relevant to the meeting.

You will note that each section of the agenda has relatively short presentations followed by a considerable amount of time for discussion. Speakers should plan on giving **short** talks (15-20 minutes each) on the assumption that this expert audience needs neither poetry nor much by way introduction to the topics. Please convey your information crisply and highlight important questions for group discussion.

A White Paper capturing the presentations and discussion will be an extremely valuable output from our meeting for the instrument teams, STScI, and the broad community planning to use JWST for transit observations. To that end I would like to ask for volunteers to serve as rapporteurs for each of the nine sessions who would be in charge of collecting material from each speaker and assembling it into a coherent section. Rapporteurs would become co-authors of the White Paper that we would, at a minimum, put on astro-ph and potentially publish in PASP.

Finally, some logistics:

- We have set aside a hotel block at the Pasadena Sheraton. Click here to make your hotel reservations (deadline Feb. 24):
<https://www.starwoodmeeting.com/StarGroupsWeb/booking/reservation?id=1401020001&key=A63B4>
- We have a password-protected website that you can access for information about the meeting as the time approaches. We will also gather Powerpoint/PDF presentations on the site for future reference.
Meeting Website: <https://nexsci.caltech.edu/committees/JWST/index.shtml>
User name: JWST_transits
Password: ipac*March2014
- For further details or questions, please contact me or Ellen O'Leary (ellen@ipac.caltech.edu).

I look forward to seeing you in March in Pasadena, if not at the AAS next week. Please email me if you have suggestions for the agenda (speakers for remaining gaps, new topics, lunch talk). Also, please send me a note if you are interested in volunteering as Rapporteur for some session.

With best wishes for the New Year,

Chas Beichman, for the Scientific Organizing Committee:
M. Clampin, D. Deming, R. Doyon, P. Ferruit,
H. Knutson, D. Latham, J. Lunine,
M. Rieke, G. Rieke, M. Robberto

Confirmed Participants

Jacob Bean (Chicago)
Chas Beichman (JWST/NIRCam)
Stephan Birkmann (JWST/NIRSpec)
Jeroen Bouwman (MPIA)
Sean Carey (Spitzer)
Jesse Christiansen (NExScI)
David Ciardi (NExScI)
Mark Clampin (JWST/Project)
Nick Cowan (Northwestern)
Ian Crossfield (MPIA)
Drake Deming (HST/Spitzer)
Pieter Deroo (JPL)
René Doyon (JWST/NIRSS)
Courtney Dressing (CfA)
Pierre Ferruit (JWST/NIRSpec)
Jonathan Fortney (Theory)
P. Goudfrooij (STScI)
Tom Greene (JWST/NIRCam/MIRI)
Matt Greenhouse (GSFC)
Dean Hines (STScI)
Steve Howell (Kepler)
Eliza Kempton (Grinell)
Tony Keyes (STScI)
Heather Knutson (Spitzer)
Laura Kriedberg (Chicago)
D. Lafrenière (NIRISS)
Pierre-Olivier Lagage (JWST/MIRI)
Dave Latham (TESS)
Jonathan Lunine (JWST)
Avi Mandell (GSFC)
Peter McCullough (STScI)
Mike Ressler (JWST/MIRI)
George Ricker (TESS)
Marcia Rieke (NIRCam)
George Rieke (JWST/MIRI)
Massimo Roberto (STScI)
David Sing (Exeter)
Roger Smith (Caltech)
John Stansberry (STScI)
Mark Swain (HST/Spitzer)
Wes Traub (JPL)
Jeff Valenti (STScI)
Gautam Vasisht (JPL)

***** AGENDA V1.1*****

I. Goals of Meeting--- Beichman/Lunine

- A. Identify key exoplanet (transit) science opportunities for JWST.
- B. Identify appropriate instrument modes for different science cases.
- C. Ensure optimized observatory operation & data processing
- D. Identify ways to engage broad exoplanet community in JWST.
- E. Discussion (→Generate WP summarizing meeting results)

II. Key Science Opportunities

- A. Spectroscopy of Giant Planets --- J. Fortney
- B. Spectroscopy of Super Earths --- Eliza Kempton
- C. Atmospheric Dynamics and weather ---H. Knutson
- D. Known transit validation, high precision characterization (TTV), searches for new planets in known systems--- D. Deming
- E. Discussion

III. Transit Best Practices

- A. HST best performance and best practices---D. Sing & A. Mandell
- B. Kepler best performance and best practices --- J. Christiansen
- C. Spitzer best performance and best practices ---S. Carey and I. Crossfield
- D. Discussion

IV. JWST operations for transit observation --- M. Clampin & J. Stansberry

- A. Data rate and storage issues
- B. Image trailing
- C. Maximum Uninterrupted duration
- D. Pointing control stability (control)
- E. Image Quality, temporal variability and SI tuning
- F. Pointing knowledge for post-processing
- G. Observation planning and Exposure Time Calculators
- H. Observing in an Event Driven Environment (or Oops! I missed your transit)
- I. What time is it anyway (UT, JD, BJD) and how well do I know it?
- J. Discussion

V. Detector Problems and Features

- A. HgCdTe --- M. Rieke
- B. Silicon detectors --- Jeroen Bouwman
- C. Challenges in Measurement Repeatability --- M. Swain

VI. Targets for JWST

- A. Ground RV/transits --- J. Bean
- B. Kepler and K2 --- S. Howell
- C. TESS --- D. Latham
- D. M stars as JWST targets---Courtney Dressing
- E. CHEOPS --- Invitation sent

- F. GAIA --- Alessandro Sozzetti
- G. Precursor Data needs (orbit info, timing, variability, etc) --- D. Ciardi
- H. The Challenge of Stellar Variability --- **Volunteer needed**

VII. Instrument modes for transits

- A. NIRSPEC –P. Ferruit & S. Birkmann
 - 1. *Instrument overview*
 - 2. *Bright star limit*
 - 3. *Suggested modes for transit work*
 - 4. *Target Acquisition and pointing requirements*
 - 5. *Simulations to date w. estimated integration times*
 - 6. *Operational limitations*
 - 7. *Fill out pre-defined performance template, e.g. table listing science goals with appropriate wavelengths, time coverage, resolution, and photometric precision)*
- B. NIRISS ---R. Doyon & D. Lafrenière
 - 1. *Instrument overview*
 - 2. *Bright star limit*
 - 3. *Suggested modes for transit work*
 - 4. *Target Acquisition and pointing requirements*
 - 5. *Simulations to date w. estimated integration times*
 - 6. *Operational limitations*
 - 7. *Fill out performance template*
- C. NIRCAM ---T. Greene & TBD (STScI/UofA)
 - 1. *Instrument overview*
 - 2. *Bright star limit*
 - 3. *Suggested modes for transit work*
 - 4. *Target Acquisition and pointing requirements*
 - 5. *Simulations to date w. estimated integration times*
 - 6. *Operational limitations*
 - 7. *Fill out performance template*
- D. MIRI --- T. Greene & P.-O. Lagage
 - 1. *Instrument overview*
 - 2. *Bright star limit*
 - 3. *Suggested modes for transit work*
 - 4. *Target Acquisition and pointing requirements*
 - 5. *Simulations to date w. estimated integration times*
 - 6. *Operational limitations*
 - 7. *Fill out performance template*
- E. Discussion: Optimum combination of instruments
 - 1. *Science requirements for optimum multi-wavelength coverage*
 - 2. *Technical requirements for best data quality, e.g. parallel mode pointing reconstruction from NIRCAM imaging*

VIII. Data Processing challenges and requirements

- A. What is the smallest planet JWST will characterize? --- Deming & Traub
- B. Laboratory testbeds --- Gautam Vasisht, **TBD**
- C. Data Simulations --- S. Birkmann, STScI instrument teams
- D. Pipeline Data Processing Challenges --- P. Deroo
- E. Discussion

IX. Engage the Community

- A. Status of Science Timeline for JWST --- J. Kalirai (or alternate)
- B. What does the transit community need from “Commissioning” and “Early Release” science for observation planning --- M. Roberto
- C. Ideas for Community Grand Challenges ---J. Valenti
- D. Discussion and plans for White Paper --- M. Clampin/C. Beichman