

Chondrules as Astrophysical Objects

May 9-10, 2017

The University of British Columbia, Vancouver, BC, Canada

Conference Organizers

Aaron Boley

Melissa Morris

Fred Ciesla

Conference Sponsors

Peter Wall Institute for Advanced Studies (PWIAS)

Department of Physics and Astronomy, University of British Columbia

The Meteoritical Society

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Abstracts for this conference are available via the conference website at

<https://www.hou.usra.edu/meetings/astrophysobjects2017/pdf/program.pdf>

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Tuesday, May 9, 2017
WELCOME AND INTRODUCTIONS
9:00 a.m. Sage East

Posters will be up both days and available for viewing during discussion periods and breaks.

Chairs: **Aaron Boley**
 Fred Ciesla

9:00 a.m. Boley A. * Ciesla F. *
 Welcome and Introductions

SESSION I
9:40 a.m. Sage East

Chairs: **Sara Russell**

9:40 a.m. Russell S. S. * Connolly H. C. Jr. Krot A. N.
 Constraints on Chondrule Formation from Investigations of Meteorites: As Summary of the Workshop on Chondrules and the Protoplanetary Disk held in London in February 2017 [#2020]
 Here we summarise the discussion and outcomes of a meeting on chondrules and the protoplanetary disk held in London in February 2017.

10:00 a.m. Hubbard A. * Mac Low M.-M.
 Complementarity and the Formation of Chondrite Parent Bodies: A Window on Dust Coagulation [#2015]
 Complementarity implies that chondrules and matrix within given chondrites are co-genetic, drawn from a single mass reservoir. Complementarity also requires that chondrite assembly sample that mass reservoir evenly, which constraints dust growth.

10:20 a.m. DISCUSSION

10:30 a.m. *Coffee Break*

Tuesday, May 9, 2017
SESSION II
10:45 a.m. Sage East

Chairs: Melissa Morris
Mordecai-Mark Mac Low

- 10:45 a.m. Xiang C. Matthews L. S. Carballido A. Morris M. A. * Hyde T. W.
Modeling the Growth of Chondrule Dust Rims with Molecular Dynamics [#2021]
We present a numerical method to study the structure of dust rims formed around chondrules as the latter sweep up dust in the solar nebula gas. An N-body code is used to model detailed collision processes between aggregates and a mm-sized sphere.
- 10:50 a.m. Ali A. * Nasir S. J. Jabeen I.
An Oxygen Isotopic Link Between Rumuruti and Ordinary Chondrites from Oman: Evidence from the Chondrules in Dhofar 1671 (R3.6) [#2002]
A genetic link between Rumuruti and ordinary chondrites is revealed by the O-isotope compositions of the bulk chondrules in the Dhofar 1671, an R type find from Oman. The data from these chondrules connect the L6 type OCs recently found in Oman.
- 10:55 a.m. Morris M. A. *
An Assessment of Current Models of Chondrule Formation [#2030]
In this talk, a brief overview of several of the proposed chondrule formation models will be presented.
- 11:35 a.m. Haugboelle T. * Grassi T. Frosthalm Mogensen T. Wielandt D. Larsen K. K. Vaytet N. M. Connelly J. Bizzarro M.
Formation of the First Solids at the Birth of Our Solar System [#2025]
We present a new model of CAI formation under special conditions in the first thousands of years of the protosun. It is a strong constraint for models of the formation of our and other Solar Systems, and can be used to make meteoritic predictions.
- 11:55 p.m. DISCUSSION
- 12:05 p.m. BIG QUESTIONS
- 12:30 p.m. *Lunch*

Tuesday, May 9, 2017
SESSION III
2:00 p.m. Sage East

Chairs: Alexandra Perez
Fred Ciesla

- 2:00 p.m. Hasegawa Y. * Matsumoto Y. Wakita S. Oshino S. Turner N. J. Masiero J.
Impact Jetting and the Origin of Ordinary Chondrites [#2011]
We explore impact jetting as a mechanism to form chondrules and subsequent pebble accretion as a mechanism to generate parent bodies of chondrites, and investigate how these two processes can account for the currently available meteoritic data.
- 2:20 p.m. Mai C. * Desch S. J. Boley A. C.
Magnetic Fields in the Chondrule-Forming Region of a Planetary Bow Shock [#2016]
Chondrules have remanent magnetizations / If they were formed in a planetary bow shock / Did they record the background B field in the solar nebula?
- 2:40 p.m. Perez A. M. * Desch S. J. Schrader D. L. Till C. B.
Can Porphyritic Chondrules Form in Planetary Embryo Bow Shocks? [#2014]
This work investigates the validity of planetary embryo bow shocks as a possible chondrule formation mechanism. We have conducted experiments to test whether cooling rates > 3000 K/hr can yield porphyritic textures.
- 3:00 p.m. DISCUSSION
- 3:15 p.m. *Coffee Break*

Tuesday, May 9, 2017
SESSION IV
3:30 p.m. Sage East

Chairs: Matthew Payne
Kevin Walsh

- 3:30 P.M. Miura Y. * Kato T.
Chondrules and Exochondrules Formed in Open Process of the Solar System [#2028]
Chondrule is formed slowly cooled by from vapor, fluid to larger solid process. Chondrules and exochondrules are observed at cooling process during larger or multiple collision at explosive plume area.
- 3:35 p.m. Hernández-Reséndiz P. * Cervantes-de la Cruz K. E. Segura A. U'Ren A.
Cruz-Ramirez H. Ángeles-García B. S.
Barred Olivine Chondrules Melts Generated Experimentally and Their Thermal Histories [#2006]
We simulate the formation of chondrules by melting olivine grains with 50W CO₂ laser. We measure the temperature during the formation of the artificial chondrules. We compare the melts characteristics with the natural chondrules.
- 3:40 p.m. Montoya-Perez M. A. * Cervantes-de la Cruz K. E. Ruvalcaba-Sil J. L.
Nondestructive Method for Bulk Chemical Characterization of Barred Olivine Chondrules [#2026]
This work develops a bulk chemical characterization of barred olivine chondrules based on the XRF analysis using a portable equipment at the National Research and Conservation Science Laboratory of Cultural Heritage (LANCIC-IF) in Mexico City.
- 3:45 p.m. Cervantes-de la Cruz K. E. * Hernández-Reséndiz P. Segura A. Cruz-Hernández H.
Ángeles-García B. S. U'Ren A.
Fast Cooling of Chondrules to Prevent Evaporation of Fe-Ni: Constraints from Experimental Chondrules [#2019]
Cristals edges are natural frontiers were Fe-Ni condensate during crystallization of chondrules. Quick time are necessary to prevent the volatization of Fe-Ni.
- 3:50 p.m. Walsh K. J. *
Constraining the Early Asteroid Belt [#2031]
Here we focus on the implications for the primordial asteroid belt mass and dynamical excitement for different flavors of terrestrial planet formation models.
- 4:30 p.m. Gladman, B. *
Dynamics of Meteoroids and Their Parent Bodies
- 4:50 p.m. Payne M. J. *
Extinct Stars and Eviscerated Planets: Using Observations of White Dwarf Pollution to Understand the Formation, Composition and Evolution of Planetary Systems [#2005]
I will discuss the work that will required for the white-dwarf community to be able to extract the unique data that only white dwarf systems can supply on the fundamental processes governing the formation and evolution of planetary systems.
- 5:10 p.m. Lawler S. M. *
How Would Planet 9 (if it Exists) Affect the Distribution of Pebbles and Planetesimals in the Outer Solar System? [#2027]
I use dynamical simulations of the distant Kuiper Belt with or without an additional Planet 9 to discuss the possibilities for Planet 9's formation, and whether or not planetesimal and pebble belts could survive this process.

Wednesday, May 10, 2017
SESSION V
9:00 a.m. Sage East

Chairs: **Aaron Boley**
 Catherine Espaillat

- 9:00 a.m. Espaillat C. *
 Observations and Evolution of Dusty Protoplanetary Disks [#2004]
 Observations and theory of disks.
- 9:40 a.m. Kita N. T. * Tenner T. J. Ushikubo T. Nakashima D. Defouilloy C. Hertwig A. T.
 Chaumard N. Rudraswami N. G. Weisberg M. K. Kimura M. Nagahara H. Bischoff A.
 Oxygen Isotope Reservoirs in the Protoplanetary Disk Inferred from Chondrules in
 Primitive Meteorites [#2022]
 O-isotope systematics among chondrules from different chondrite groups suggests variability in their
 isotope reservoirs and redox conditions in the disk, and may relate to mixing between anhydrous dust
 and water ice in their precursors.
- 10:00 a.m. Hertwig A. T. * Kita N. T. Defouilloy C. Kimura M.
 Estimating Dust Enrichment and Water Ice Abundance in the Protoplanetary Disk from Oxygen Isotope
 Ratios and FeO Content of Type I Chondrules from Two CV Chondrites [#2024]
 SIMS O-isotope study of chondrules from two CVs show that most chondrules formed in
 water-ice-depleted regions at dust enrichments of x50-200. Systematic variations of isotope ratio and
 FeO content may be due to locally varying water ice abundances.
- 10:20 a.m. DISCUSSION
- 10:30 a.m. *Coffee Break*

Wednesday, May 10, 2017
SESSION VI
10:45 a.m. Sage East

Chairs: **Xuening Bai**
Fred Ciesla

- 10:45 a.m. Backus I. * Quinn T.
Dust Migration in Gravitationally Active Protoplanetary Disks [#2029]
Solid growth and planet formation may require dense regions of dust. I investigate dust migration concentration, in gravitationally active protoplanetary disks using high resolution, 3D SPH simulations.
- 10:50 a.m. White J. A. * Boley A. C.
Stellar Emission Inhibiting the Study of “Exo-Chondrules” in Circumstellar Debris [#2003]
The host stars in circumstellar disks can be a confounding parameter in recovering the disc’s properties. I’ll present examples where we can’t study the small grains due to stellar effects and discuss a project designed to solve the issue.
- 10:55 a.m. Andrews, S. *
Observations and Evolution of Dusty Protoplanetary Disks (Part II)
- 11:35 a.m. Bai X. *
Towards Realistic MHD Simulations of Protoplanetary Disks [#2009]
I will present the first fully global simulations of protoplanetary disks that take into account all three non-ideal magnetohydrodynamic effects. The results show complex flow structures with important implications for chondrule transport.
- 11:55 a.m. Mac Low M.-M. * Hubbard A. Ebel D. S.
Layered Disks as a Solution to Dynamical and Cosmochemical Constraints on Chondrule Formation [#2017]
Complementarity between chondrules and matrix is consistent with chondrule formation separated vertically from the cold disk midplane. Astrophysical models offer formation sites in magnetized surface layers or current sheets formed by disk winds.
- 12:15 p.m. DISCUSSION
- 12:30 p.m. *Lunch*

Wednesday, May 10, 2017
SESSION VII
1:45 p.m. Sage East

Chairs: Jean-François Gonzalez
Anna Hughes

- 1:45 p.m. Lambrechts M. * Morbidelli A. Johansen A.
Connecting Pebble Accretion to Chondrules [#2010]
A brief overview of our current understanding of pebble accretion will be given. Then, we will discuss the impact of chondrule-sized drifting pebbles on planetesimal-to-embryo growth in the terrestrial region.
- 2:25 p.m. Gonzalez J.-F. * Laibe G. Maddison S. T.
Self-Induced Dust Traps: Overcoming Planet Formation Barriers [#2012]
Self-induced dust traps form when taking into account the growth and fragmentation of dust grains, together with the back-reaction of dust on gas. They are favored locations for the growth of solids, and in particular chondrules.
- 2:45 p.m. Hughes A. G. * Boley A. C.
Planetesimal Growth Through the Accretion of Pebbles [#2018]
Planetesimal growth is fundamental to planet formation, but poorly understood. We present self-consistent hydrodynamic simulations to estimate planetesimal growth rates from pebble accretion. At close distances, the optimal particle size is 0.3 mm.
- 3:05 p.m. DISCUSSION
- 3:15 p.m. *Coffee Break*

Wednesday, May 10, 2017
SESSION VIII
3:30 p.m. Sage East

Chairs: **Melissa Morris**
Aaron Boley

3:30 p.m. Redd, N. *
What Draws Science Writers to Your Research?

4:10 p.m. Harley, C. *
How to Make Data Dissemination More Impactful.

4:50 p.m. DISCUSSION

5:00 p.m. FINAL REMARKS