

## **Announcing the Final Examination of Katerina Slavicinska for the degree of Master of Philosophy in Physics**

**Date:** November 15, 2021

**Time:** 11:00 a.m.

**Room:** Zoom

<https://us02web.zoom.us/j/84114086002?pwd=NnBzUGNWMTBML0NnK2xvQnYvSW9pZz09>

Meeting ID: 841 1408 6002

Passcode: w592FW

**Dissertation title:** The effects of aqueous alteration on polycyclic aromatic hydrocarbon content in carbonaceous chondrites

### **Abstract:**

The organic inventories of carbonaceous chondrites (CCs) provides insights into the physicochemical environments involved in the formation of the Solar System and the post-accretionary evolution of meteorite parent bodies. Studying changes in these inventories across samples that have experienced varying degrees of aqueous/hydrothermal alteration untangles one aspect of such complex records. In this work, the polycyclic aromatic hydrocarbon (PAH) and heterocyclic aromatic compound (HAC) content of 15 CC samples representing CI1, CM1, CM2, C2u, C3u, and CO3 classes was probed with high-resolution two-step laser mass spectrometry (HR-L2MS). PAHs with mass-to-charge ratios ( $m/z$ ) of 116 to >300 were detected, ranging from small, volatile species (e.g., C9H8, C10H8) to larger, more refractory species (e.g., C16H10, C22H12). Large PAHs (4-6 rings) dominated the spectra of the most aqueously altered samples like CI1 Ivuna and CM1 NWA 12328, while relatively unaltered samples like C3.00u Chwichiya 002 contained a larger relative fraction of smaller PAHs (3 rings). The same gradual trend was observed across CM2 samples with varying degrees of aqueously alteration except for CM2.3-2.5 Jbilet Winselwan, which has experienced impact shock. Alkylated homologs of C14H10 and C16H10 were detected in all samples; while the fraction of alkylated homologs of C14H10 was higher, C16H10 alkylation showed a stronger correlation with aqueous alteration. Additionally, several HACs including thiophenes and oxygen-containing PAHs were detected. These experiments demonstrate that aqueous alteration generally increases the size and alkylation of PAHs in CCs of multiple chemical groups. Thus, secondary alteration significantly alters the PAH contents of CCs, and PAH size and alkylation distributions may be an additional parameter to consider when evaluating a meteorite's alteration history

### **Outline of Studies:**

Major: Physics, Planetary Science Track

### **Educational Career:**

B. S. Kennesaw State University, GA, 2018

### **Committee in Charge:**

Dr. Christopher Bennett (Chair)

Dr. Kerri Donaldson Hanna

Dr. Humberto Campins

Dr. Claire Pirim (External Committee Member)

Approved for distribution by Dr. Christopher Bennett, Committee Chair, on November 1, 2021.

The public is welcome to attend remotely.