



## Wheland Lecture

The University of Chicago  
*Department of Chemistry Colloquium*

*Professor John P. Maier*

*University of Basel*

Hosted By: Takeshi Oka



**Monday March 27, 2017**

**Kent 120**

**4:00 pm**

*Refreshments will be served following the event*

### **Electronic Spectroscopy of C<sub>60</sub><sup>+</sup> and its Identification in Interstellar Space**

After the discovery of C<sub>60</sub>, the question of its relevance to the diffuse interstellar bands (DIBs) was raised. H.W.Kroto wrote in 1987: “The present observations indicate that C<sub>60</sub> might survive in the general interstellar medium (probably as the ion C<sub>60</sub><sup>+</sup>) ....”.

In 1994 two DIBs at 9632 and 9577 Å were detected and proposed to be the absorption features of C<sub>60</sub><sup>+</sup>. This was based on the proximity of these wavelengths to the two prominent absorption bands of C<sub>60</sub><sup>+</sup> measured by us in a neon matrix in 1993. Confirmation of the assignment required the gas phase spectrum of C<sub>60</sub><sup>+</sup> and was achieved in 2015. The approach confines C<sub>60</sub><sup>+</sup> ions in a radiofrequency trap, cools them by collisions with high density helium allowing formation of the C<sub>60</sub><sup>+</sup>-He complex below 10 K. The photofragmentation spectrum of this mass-selected species is recorded using a cw laser. Measurements on C<sub>60</sub><sup>+</sup>-He<sub>2,3</sub> show that a helium atom shifts the absorptions by 0.7 Å. The C<sub>60</sub><sup>+</sup> absorptions have band maxima at the DIB wavelengths, with widths and relative intensities in accord. This is a first identification of DIBs and proves the presence of gaseous C<sub>60</sub><sup>+</sup> in the diffuse interstellar medium. The electronic spectrum of C<sub>70</sub><sup>+</sup>-He has also been obtained and the relevance of other fullerene cations are considered.

*Persons with a disability may call (773) 795-5843 in advance for assistance*

