Theoretical Insight into the New Astrochemistry Hypothesis of Mixed Aromatic Aliphatic Organic Nanoparticles (MAON)

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Scientific Background

Observations and proposed models





MAON



Kwok and Zhang, Nature, 479:80 (2011) Sadjadi, Zhang and Kwok, ApJ, 807:95 (2015 July 1)



MAONs Infrared Fingerprint

Simulated IR spectra for C_{155} H₂₄₀, DFT/Drude, T=500 K



Sadjadi, Zhang and Kwok, ApJ, 807:95 (2015 July 1)



MAONs Infrared Fingerprint

Simulated IR spectra for 40 MAONs, DFT/Drude, T=500 K



Sadjadi, Zhang and Kwok, ApJ, 807:95 (2015 July 1)



PAHs Infrared Fingerprint

Simulated IR spectra for 60 PAHs, DFT/Drude, T=500 K

















Vibrational motion at 11.16 μm





Vibrational motion at 13.20 μm



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NGC7027

12.8 13.5

11.24

Vibrational motion at 19.06 µm (32% aromatic, 78% Aliphatic)



Flow Chart

The backbone of our theoretical approach



Sadjadi, Zhang and Kwok, ApJ, 801:34 (2015 March 1)



Conclusions

- MAON model is introduced as the individual benzene rings, connected by aliphatic hydrocarbon chains.
- MAON is very simple in bonding, but it is complex in its structure.
- MAON shows discrete and consistent IR bands at different molecular sizes.



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