MONTANA STATE UNIVERSITY | College of LETTERS & SCIENCE

Physics Colloquium

Friday, August 28, 2015
4:10 – 5:00 PM
EPS103

DNA's Day in the Sun: How the Double Helix Avoids Photodamage

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Abstract:
The microscopic events that limit how often DNA is damaged by UV radiation are only now coming into focus. Femtosecond laser experiments show that UV absorption creates charge-separated states consisting of oppositely charged radical ions in single-stranded DNA. These states are only observed when two or more DNA nucleobases are stacked and in van der Waals contact. In double-stranded DNA, femtosecond time-resolved IR (TRIR) experiments reveal a distinctive photoinduced proton-coupled electron transfer (PCET) deactivation mechanism in which an electron moves between nucleobases on the same strand, attracting a proton from the opposite strand. In biology, PCET usually couples long-range electron transfer to short-range proton transfer, but in DNA electron and proton donors and acceptors are in intimate contact. This architecture favors efficient charge recombination explaining why tautomeric base pair radical ions can be high-yield intermediates during excited state decay without compromising photostability. Insights into photoinduced PCET in DNA and other model systems provide a new framework for understanding and manipulating charge carrier formation and transport in DNA sequences and other nanoscale systems.

Host:
Rufus Cone

****** Refreshments served in the EPS second floor atrium at 3:45 ******