BOSTON UNIVERSITY

SPACE PHYSICS SEMINAR

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The solar bow shock revisited: Is it a slow shock?

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Refreshments at 3:30pm in CAS 500
Talk begins at 4:00pm in CAS 502

Abstract:
Recent observations by NASA's Interstellar Boundary Explorer (IBEX) show that the speed of the interstellar wind, i.e. the relative speed of the local interstellar medium (LISM) with respect to the Sun, is slower than prior estimates from Ulysses. On the other hand, the termination shock crossings of the Voyager spacecraft revealed a strong asymmetry in the heliosphere, implying a much stronger interstellar magnetic field than previously thought. Based on these results, it has been concluded that the interstellar wind is most certainly sub-Alfvénic, and no fast magnetosonic bow shock can exist ahead of the heliosphere [McComas et al., Science, 2012]. In my presentation, I will review the currently accepted parameter regime of the LISM. Then I will discuss the possibility of a slow magnetosonic bow shock on theoretical basis. Finally, I will show multi-ion multi-fluid MHD simulation results that provide evidence for a weak quasi-parallel slow bow shock ahead of the heliosphere. Voyager 1 is heading towards this localized slow bow shock, while Voyager 2 will never cross it, which means that the two spacecraft are expected to encounter fundamentally different interstellar plasma populations beyond the heliopause.