RSPP seminars

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"Towards an understanding of the energy balance in Saturn's thermosphere"

"For several decades, the temperatures in the upper atmospheres (thermospheres) of giant planets have remained poorly understood, being 300-600 K hotter than expected from solar heating alone. This "energy crisis" highlights a fundamental lack of understanding of the energy balance in giant planet atmospheres. One hypothesis brought forward to resolve this suggests that the missing energy might originate from the deeper atmosphere and be transported into the thermosphere by upward propagating gravity or acoustic waves which dissipate and break, directly releasing their energy into the thermosphere. However, this was shown both for the cases of Jupiter and Saturn to only provide part of the necessary energy flux into the thermosphere despite recent evidence of locally enhanced temperatures above Jupiter's Great Red Spot which may be linked to turbulence and waves. This emphasises the need to find a physical process that could explain Saturn's and Jupiter's high temperatures. With recent simulations by the Saturn Thermosphere Ionosphere General Circulation Model (STIM) we managed to gain a deeper understanding of the processes that shape the energy balance on giant planets, highlighting the importance of energy transport. We found that upward propagating gravity waves and turbulence alter the momentum balance in the upper atmosphere, changing the wind system to allow global redistribution of heat generated by magnetosphere-atmosphere interactions near the poles".

UNIVERSITY OF LEICESTER

Wednesday, September 27th at 2 pm in Physics LTB