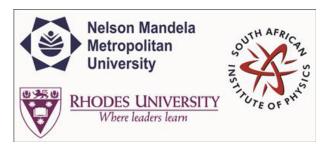
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Contribution ID: 113

Type: Oral Presentation

### Electronic and Optical Properties of monolayer MX 2 M= Zr, Hf; X= S, Se from first principles calculations

Tuesday, 30 June 2015 14:20 (20 minutes)

# Abstract content <br> &nbsp; (Max 300 words)<br><a href="http://events.saip.org.za/getFile.py/atarget="\_blank">Formatting &<br>Special chars</a>

Transition metal di-chalcogenide (TMDC) monolayer have potential applications in electronic and optical devices. Work on these atomically thin semiconductors is an exciting emerging field of research. In this research the electronic, photo-emission and photo-absorption properties of monolayer ZrS 2, ZrSe 2, HfS 2 and HfSe 2 have been investigated using density functional theory (DFT) and many body perturbation theory at the level of the partially self consistent GW 0 approximation. Solution of the Bethe-Salpeter equation (BSE) in the Tamm-Dancoff approximation was used to investigate the optical properties of these monolayer TMDCs. The structures were found to be semiconductor with band gaps within the visible range of the spectrum. Exciton binding energies were estimated from a comparison of the GW and BSE results.

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Session Classification: DPCMM

Track Classification: Track A - Division for Physics of Condensed Matter and Materials