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## Bits of the future: emergent physics for advanced magnetic information technologies

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

Hard-disk drives continue to dominate information storage and magnetic devices are emerging in memory and processing applications. Because these applications rely upon the magnetic order parameter they are inherently non-volatile. Furthermore, the dissipation energy of magnetic processes can be orders of magnitude smaller than comparable semiconductor services. However continued progress in magnetic information technologies will require new approaches and materials for controlling magnetism at the nanoscale. In this presentation I will review the challenges for achieving high-density and low power magnetic information technologies. To address these challenges I will discuss new ways to control magnetism beyond using applied magnetic fields. I will focus on recent experiments using sub-ps spin-polarized current pulses and sub-ps circularly-polarized light pulses to switch nano-magnets. In particular the recent demonstration of all-optical control of ferromagnetic materials using 100-fs optical pulses opens a range of new potential applications and probes fundamental ultra-fast processes in magnetic materials.

**Apply to be<br> considered for a student <br> &nbsp; award (Yes / No)?**

No

**Level for award<br>&nbsp;(Hons, MSc, <br> &nbsp; PhD)?**

N/A

**Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?**

Yes

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