



Contribution ID: 427

Type: **Poster Presentation**

## A Monte Carlo Simulation of a Noisy Quantum Channel with Memory

*Tuesday, 8 July 2014 17:10 (1h 50m)*

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

The classical capacity of quantum channels is well understood for channels with uncorrelated noise. For the case of correlated noise, however, there are still open questions. We calculate the classical capacity of a forgetful channel constructed by Markov switching between two depolarizing channels. Techniques have previously been applied to approximate the output entropy of this channel and thus its capacity. In this paper, we use a Metropolis-Hastings Monte Carlo approach to numerically calculate the entropy. The algorithm is implemented in parallel and its performance is studied and optimized. The effects of memory on the capacity is explored and previous results are confirmed to higher precision.

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

Yes

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

PhD

**Main supervisor (name and email)<br>and his / her institution**

Francesco Petruccione, petruccione@ukzn.ac.za, Quantum Research Group, School of Physics, University of KwaZulu-Natal

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

Yes

**Primary author:** Dr AKHALWAYA, Ismail (University of Johannesburg)

**Co-authors:** Prof. PETRUCCIONE, Francesco (UKZN); Dr MOODLEY, Mervlyn (University of KwaZulu-Natal)

**Presenter:** Dr AKHALWAYA, Ismail (University of Johannesburg)

**Session Classification:** Poster1

**Track Classification:** Track G - Theoretical and Computational Physics