



NITheP Colloquium

Monday, 3 May 2021, 16h00

Prof Azwinndini Muronga | Nelson Mandela University

Ms Thuthukile Khumalo | University of the Witwatersrand/iThemba LABS

Ms Khodani Mafune | University of Venda

Mr Bradley Nmutudi | University of Limpopo

“Statistical and Thermal models for heavy-ion collisions and astrophysics”



Relativistic heavy-ion collisions at high energies such as those at the Relativistic Heavy Ion Collider (RHIC), Brookhaven National Laboratory (BNL), Long Island, New York and at the Large Hadron Collider (LHC), CERN, Geneva produce new state of matter leading up to many new particles. One approach to understanding the properties of the produced hot and dense matter in these collisions is based on statistical thermodynamics. In this presentation we will show how using the knowledge of statistical thermodynamics from undergraduate physics one can describe the final stage of the evolution of heavy ion collisions. We will show this by comparing our theoretical calculations with data from heavy ion collider experiments.

OVERVIEW OF THE 2020/2021 INTERNSHIPS

During the 2020 Summer NITheP Internship Programme, about 30 students from across South African universities were hosted at Nelson Mandela University (NMU) by Professor Azwinndini Muronga for research projects under the umbrella theme “*Understanding the properties of matter under extreme conditions in heavy ion collisions and astrophysics - Connecting quarks to the cosmos.*” The students were grouped into seven topical groups. These topical groups were:

- *Modelling particle production in heavy-ion collisions*
- *Statistical and Thermal models for heavy-ion collisions and astrophysics presented*
- *Introduction to relativistic kinetic theory and the particle phase space analysis using UrQMD*
- *Landau hydrodynamics for high-energy nuclear collisions*
- *Bjorken hydrodynamics for high-energy nuclear collisions*
- *Equation of State of neutron stars*
- *Mathematical modelling of COVID-19 using South African data*

In this presentation the work done by the topical group *Statistical and Thermal models for heavy-ion collisions and astrophysics*, which was facilitated by Ms Thuthukile Khumalo will be presented.

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WANT TO FIND OUT MORE?

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