Cosmic Histories

by Lerothodi Lapula Leeuw

on 11 March 2025 for Roy at 70

Outline of the Cosmic Histories

1. **Academic**
   Featuring Roy and more

2. **Supporting**
   Featuring with Roy

3. **Recordings**
   Invitation to Roy and you

4. **The Underlying Laws**
   Inspired by Ellis 2024

5. **Opportunity** - Rhodes Scholarships
   For you or those you may know

1.1 Academic Cosmic Histories

Lerothodi an MSc Student at UCT and SAAO

with **Richard Ellis, JWST Plenary Speaker,** in Cape Town, IAU GA 2024
with Barbara Ellis & John Menzies in Stellenbosch, **1995**
with Sabelo Kunene, my MSc Student, in Cape Town, IAU GA 2024,

1.2 Academic Cosmic Histories
Lerothodi an MSc Student **visiting UKZN around 1995**

with Orlando Pirates players **at Durban Airport around 1995,** after attending **a workshop on General Relativity by Sunil Maharaj and Roy Maartens,** on recommendation from **George Ellis, our Honours Professor** for General Relativity. These were *extra courses and activities* I was doing to the MSc Thesis.

1.3 Academic Cosmic Histories

Lerothodi's Postdoc – King **Pedro Mafa, of Sunil, Roy, George,** Dennis and now has a **permanent position at UKZN**

Model of compact star with ordinary and dark matter, **Mafa, Leeuw, Maharaj** 2020
Effect of electric charge on conformal compact stars, **Mafa, Leeuw, Maharaj** 2019

CFD humidity and temperature modelling in the ATLAS ITK Strip, **TP Mafa**, M Bhamjee, SH Connell, LL Leeuw

Infectiousness model of expelled droplets exposed to ultraviolet germicidal irradiation coupled with evaporation, Mbolahasina Ralijaona, Emmanuel Igumbor, Muaaz Bhamjee, Kennedy Otwombe, Firdaus Nabeemeeah, Minja Milovanovich, Neil Martinson, **Pedro Mafa, Lerothodi Leeuw** and Simon Connell, 2024

CERN ATLAS – Elementary Particle Searches, … TP Mafa, SH Connell, LL Leeuw …

1.4 Academic Cosmic Histories

Prof Lerothodi's Research Group **at UWC**

Serveral students (partially) supported **with Roy or CRC Funds**

2.1 **Supporting** Cosmic Histories
National Astronomy Committees

Key National Astronomy Committees <u>where I served with Roy</u>

Astronomy in South Africa – A Multi-Wavelength Strategy Long - Term Plan, 2014

More than 130 page document still impactful

Astronomy Desk Panels (around 2010 - 2014)

Part of the management of astronomy in SA at testing time

SKA SA / SARAO User Committee

Roy, chaired, coordinated user feedback and made recommendations for the use of MeerKAT

SKA Bursary Conference Committee (he, more than me)

Roy was trategic leader and improved quality of the meeting

3.1 Recording Cosmic Histories

From the American Astronomical Society (AAS) Meeting 2025, DC

Getting the South African Oral History Project Online

Jarita Holbrook(1), Lerothodi Leeuw(1,2) and Sibaliso Mhlanga(1,3)

1. University of the Western Cape (UWC), 2. University of South Africa (UNISA), 3. National Research Foundation (NRF)

UNIVERSITY of the WESTERN CAPE

PRESENTED AT:

AAS 245 iPoster Sessions Sponsored by AAS PUBLISHING

Inviting you, Roy and all reading this to participate and use this important resource

3.1 Recording Cosmic Histories

From the American Astronomical Society (AAS) Meeting 2025, DC

Getting the South African Oral History Project Online

Jarita Holbrook(1), Lerothodi Leeuw(1,2) and Sibaliso Mhlanga(1,3)

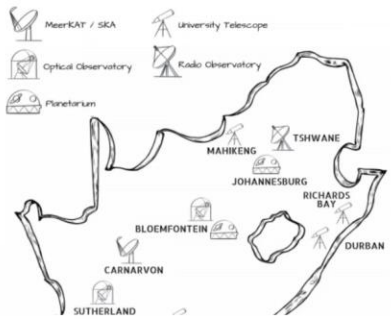
1. University of the Western Cape (UWC), 2. University of South Africa (UNISA), 3. National Research Foundation (NRF)

Overview

The project captures the lives, experiences, and wisdom of astronomers, technicians, and other contributors connected to astronomy in South Africa. In 2019 South Africa celebrated 200 years of Modern Astronomy; because in 1819 was the establishment of the Royal observatory of the Cape of Good Hope. Since 2000, South Africa has heavily invested in big ticket observatories, and today that generation of Astronomers are in their twilight years. Therefore the community recognized the need

OPEN

South African Observatories



OPEN

The Project

ABSTRACT:

In 2016 we started the Oral History Project for South Africa with the support of their National Research Foundation (NRF) History of Astronomy Roadmap Initiative. Unlike the AAS Oral History Project, each interview is video recorded and each video is auto-transcribed. Many interviews were done in five-minute intervals with intention. Thinking about future use of the interviews by researchers, it is easy to search a five-minute segment for specific content. There is a postdoctoral fellow working on the project that reviews all the transcriptions for errors and makes corrections. The final check is done by the person interviewed. Having a dedicated person doing the initial check has made the process much faster. The latest effort has been towards getting the archive online. As a way of accounting for the investment and measuring the significance of the project, we need to keep track of how many people are using the archive and for what purposes. So, we designed a web form which is the first step towards getting access to the archive after the welcome website which lists the people interviewed. This presentation includes more details about the project, the people interviewed and showcases the website.

Targeted Interviews:

1. South African astronomers and technicians living and working in the country.

OPEN

Work done thus far

List of interviewees, now 19 people:

- David Buckley
- Phil Charles
- Catherine Cress
- Michael Feast
- Ian Glass
- Kevin Govender
- Christian Hettlage
- Sthabile Kolwal
- Zin-Zhe Ma
- Gordon Macleod
- Vanessa McBride
- George Philander
- Kenneth Rice
- Hermine Schnecter
- Ramatholo Sefako
- Linda Tobin
- Petri Vaisanen
- Kurt Van Der Hayden
- Martyn Wells

The Interviews

Each interview has been video recorded. The transcripts of the interviews can be seen as video captions.

Each person has their own webpage with their videos and descriptions of the video content.

If you would like access to an interview, you have to go through the interview request form:

Interview request form

Acknowledgments

This work is made possible through the support of our host institutions and collaborators. Special thanks to the National Research Foundation (NRF) and our interviewees for their invaluable contributions.

Principal Investigators:

Dr. Jarita Holbrook (UWC)

Prof. Lerothodi Leeuw (UWC)

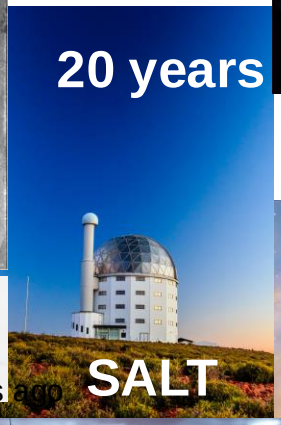
OPEN

Inviting you, Roy and all reading this to participate and use this important resource

4.1 The Underlying Laws (inspired by Ellis 2024) - Cosmic Histories

Framework below from Leeuw 2024

"Snapshots of the Evolution of Intelligent Life on Earth as Comparison Template to Life Elsewhere", IAU 387, by Lerothodi Leeuw 2024



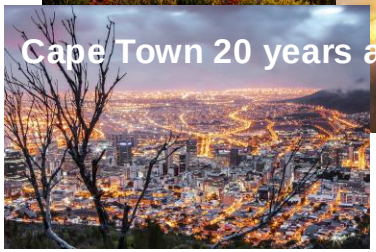
>20 000 000 years to <u>≤13.8 billion years</u>

Pythagoras
N Copernicus
Tycho Brahe
J Kepler
Galileo Galilei
Isaac Newton

$$F = G\frac{mm'}{r^2}$$

Coulomb
Maxwell
Hertz
Einstein

$$|\mathbf{F}| = k\frac{|q_1 q_2|}{d^2}$$



Feynman, Higgs, Hawking,
<u>Ellis, Maartens, Maharaj, Mafa</u>
Scientists & Students today
IAU, RAS, NASA, ESA, ESO, SETI,
SAAO, SKA, <u>UCT, UWC, WITS. UKZN</u>

4.1 The Underlying Laws (inspired by **Ellis 2024**) - Cosmic Histories

Framework below from Leeuw 2024

"Snapshots of the Evolution of Intelligent Life on Earth as Comparison Template to Life Elsewhere", IAU 387, by Lerothodi Leeuw 2024

Cosmologically, an evolving Universe initially had no structure, but
physical processes lead to the existence of galaxies, stars and planets (**Ellis 2024**).
Embedded in this large context, there emerged complexity
that includes human beings living on some habitable planet, in our case the planet Earth.

The complexity, according to **Ellis 2024**, emerged from underlying physical basis
in three different but interrelated terms,
i.e. (1) evolutional on very long timescales of over a million years,
(2) developmental on medium timescales of hours to hundred years,
and (3) functional on timescales of milliseconds to minutes. *Compare the snapshots (Leeuw)*

On our planet, human beings across the globe studied astronomy
emergent from endeavours that included religion and philosophy.

Assuming that the developmental followed underlying physical processes
of our planet embedded in the Universe, we can assume this moment and celebration
today is emergent the physical beginning of the Universe.

Some events in that history are calm and others violent, and this we *pray* is a beautiful one.

5.1 Opportunity – Rhodes Scholarships

Prof Lerothodi Leeuw appointed the Rhodes Ambassador at **UWC 2025-Roy the Rhodes Scholar.** Opportunity for you here and others deserving

THE RHODES SCHOLARSHIP FOR SOUTHERN AFRICA

Covering South Africa, Botswana, Lesotho, Malawi, Namibia and eSwatini (formerly Swaziland)

INFORMATION FOR CANDIDATES

This document is a guide to the application and selection process for the Rhodes Scholarship. Please read this carefully to make sure that you are applying to the right constituency and meet all of the eligibility criteria. You will also find important information about how to apply and what you will need to submit an application.

This information is for candidates applying to the 2025 Rhodes Scholarship through the Southern Africa constituency, for entry in October 2025 to the University of Oxford, in the United Kingdom.

Key Dates

Applications Open: 00:01 SAST, Saturday 01 June 2024
Applications Close: 23:59 SAST, Thursday 01 August 2024
Reference Deadline: 23:59 SAST, Thursday 15 August 2024