

Radio Astronomy in MADAGASCAR

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DARA - Annual Network Meeting

27-29 March 2017

SKA Activities under way

- Following the first technical assessment visit in November 2015 by the SKA engineers, we concluded the negotiations with TELMA, the owner of the antenna.
- The convention with TELMA has been signed and the key of the premises has been handed down to us.
- These are some of the main points included in the convention:
 - The convention duration (15 years with a possible extension of 5 years)
 - TELMA was reassured that the premises will not be nationalized
 - At the end of the convention, the premises are not to be restored to their state of origin
 - As TELMA works in the field of telecommunication, TELMA will be our almost exclusive partner whenever it is possible (in terms of human capacity and technical infrastructures ; optical fibers, internet connection ...)?
 - TELMA would like to get involved in our outreach program as it is very keen about promotion of science and technology and TELMA believes the company social responsibility is very important.

AVN-related Activities under way

- Preliminary discussions have been engaged with several departments.
- The department of Meteorology indicated that it would be a very good idea to install a small weather station in Arivonimamo. In the meantime, they are willing to make all the data they have regarding the weather history in the Arivonimamo area.
- The ARTEC (Telecommunication regulation Authority) will assist us for all spectral band allocation and protection.
- The engineers from TELMA assured us that the C-band should be operational without any problem as they have used it not long ago. They were very helpful in stowing the dish
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Human Capital Development

- 11 students are currently studying in South Africa
- Since last year, a department of Astrophysics has been operational at the level of Master's Degree
- Astronomy courses are currently offered at the Ecole Normale Supérieure as well as the Faculté des Sciences
 - Faculty of Science
 - IOGA
 - ENS
 - Polytechnical School (several departments: telecom, computer Science, electrical and mechanical engineering)
 - TELMA (engineers)
- Outreach activities have been going on in the country since the mid 90's. We have 2 centers for science communication : IOGA and ASTRO. This year alone, more than 30,000 students and pupils from high schools and secondary schools have visited these centers. Exhibitions, conferences, seminars, star parties and inflatable planetarium, these are all routine activities since the IYA2009
- Students, officials from the Ministry of Higher Education and Scientific Research and the Ministry of Telecommunications are all informed about the SKA project
- The SKA project was presented to the officials from the government, using materials sent by SKA office through the SA Embassy in Madagascar.
- We have several 8 telescopes and one baby radio telescope

Challenges

- Human Capital Development in Science and Engineering is always a major challenge
- There is a dire need to train the technical personnel as rapidly as we can (mechanical engineering, software engineering, RF, electronics, computer science...), antenna conversion.
- Power would be a major issue. Power stability and shortages for computers and all the various components necessary to operate the antennas properly
- Required Infrastructures for the data transport
- In terms of outreach activities, we still have a lot to do because in the long run we will have to reach the other regions and the country is huge. Science teaching has to reinvent itself.
- At the level of the administration : these people have very little interest in Science and they can be a major obstacle

Pictures showing activities



Arivonimamo





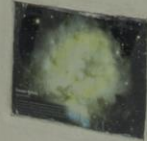








COSMOS





L'UNIVERS EN QUESTIONS





$$E=mc^2$$

God said...

$$\nabla \cdot \vec{E} = 4\pi\rho$$
$$\nabla \times \vec{B} = \frac{1}{c} \frac{\partial \vec{E}}{\partial t} + \frac{4\pi}{c} \vec{J}$$
$$\nabla \cdot \vec{E} = -\frac{1}{c} \frac{\partial \vec{B}}{\partial t}$$
$$\nabla \times \vec{B} = 0$$

and there was light
(Gen 1:3)

1,618

$$S = k_B \text{Log} W$$

$$C_3(s) = \sum_n \frac{1}{n^s} = \sqrt{|p|} \frac{1}{1 - \frac{1}{ps}}$$

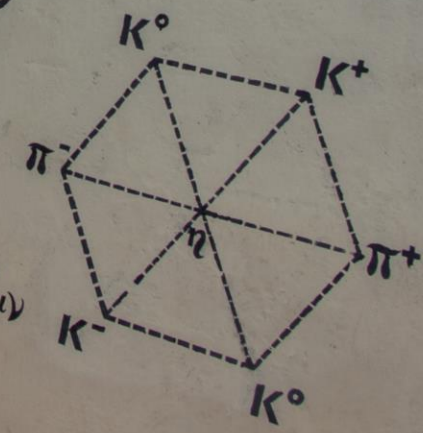
$$P^2 = a^3$$
$$R = \frac{2GM}{c^2}$$

$$M = m - J \text{Log} \frac{\sigma}{10}$$
$$H_0 = \frac{V}{d}$$

$$\frac{\hbar^2}{2m} \nabla^2 \psi + V\psi = E\psi$$

Particle

$$R_{\mu\nu} - \frac{1}{2}g_{\mu\nu}\Lambda = \frac{8\pi G}{c^4} T_{\mu\nu}$$





PAVILLON
Professeur RAOELINA ANDRIAMBOLOLONA



Science & Technology





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POUR LES GENERATIONS FUTURES
"Don't just read about science ... Do science!"
(Dr Tony Murphy, Director of the GLOBE Programme)

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