

**ASTROPHYSICS
AND
COSMOLOGY
IN ALBANIA**

Prof. Mimoza Hafizi, Tiranë, 26 September 2016

ALBANIA

- South Eastern European Country
- 3 millions of inhabitants
- 28 thousand sq-km
- GDP per capita about 7600 Euros
- Member of NATO, EU Candidate member
- Capital: Tirana, about 500 thousand inhabitants



HIGHER EDUCATION AND RESEARCH

- First Albanian University (Tirana University) founded in 1957
- In 1990 we inherited 8 HEI, all public
- First private HEI started in 2003
- Bologna system installed since 2005
- Now about 40 HEI; about 160.000 students
- The financing for education (5+4+3+HE) about 3% of GDP



for HE	0.6 %
for Research	0.05%

STUDIES IN PHYSICS

5 Bachelor programs in Physics:

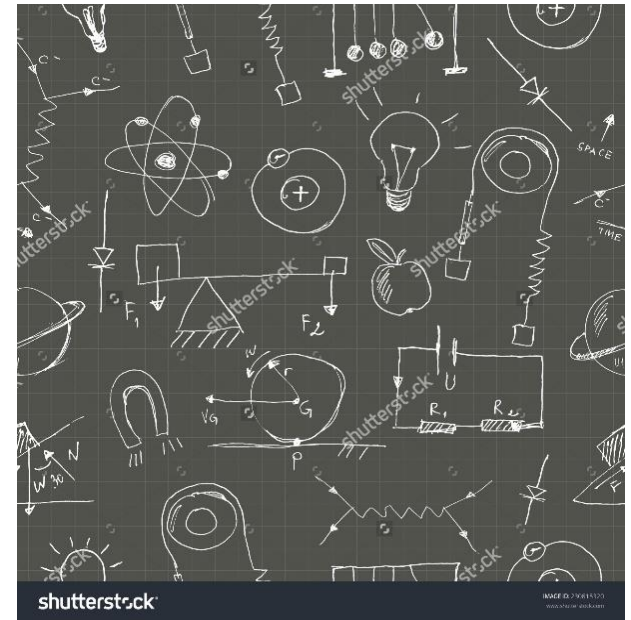
Tirana University

Shkodra University *Luigj Gurakuqi*

Elbasan University *Aleksandër Xhuvani*

Korça University *Fan Noli*

Polytechnic University



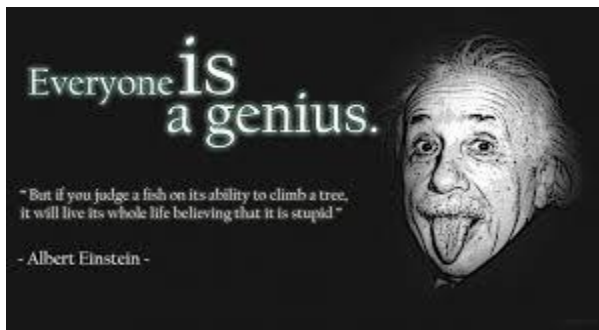
4 Master Programs in Physics

Master of Physics

Teachers of Physics for High Schools

Engineering of Physics

Teachers of Physics for Low Schools



PHYSICS IN TIRANA UNIVERSITY

Faculty of Natural Sciences, Department of Physics

100 students enrolled each year

about 35 diplomas delivered each year in Bachelor studies

about 30 diplomas delivered each year in Master studies

22 full-time academic staff

15 part-time academic staff

5 Teaching and Scientific Groups

General Physics

Biophysics

Theoretical Physics

Computational Physics

Structure of Matter



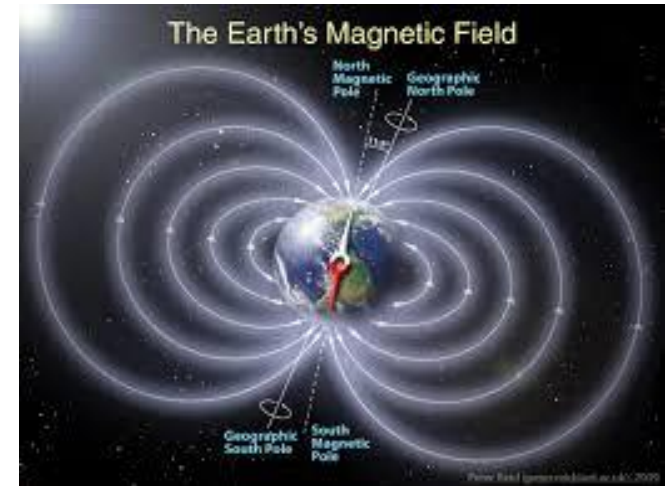
RESEARCH IN THEORETICAL PHYSICS

Geoelectricity and Geomagnetism

Geomagnetic field Modeling

Natural Convection in cylindrical and spherical geometries

2 full-time academic staff



Astrophysics

Gamma Ray Bursts;

Dark galactic bodies

Gravitational Microlensing

Quintessence

2 full-time academic staff



RESEARCH IN ASTROPHYSICS

In the field of GRB, a good expertise is developed in

- spectral peak energy-luminosity relations
- spectral lag
- time duration-luminosity relations

A close cooperation with Institute of Astrophysics, Paris

Good communications with some Italian groups, working on GRB

Part of Theseus, a medium ESA project in process

In the field of Gravitational Microlensing method

Mainly on free-floating planets

Their population in our Galaxy, based on observations of MOA, OGLE, EUCLID, KEPLER, WFIRST telescopes

A close cooperation with Department of Physics, Lecce University

PAPERS AND REVIEWS

- Mimoza Hafizi, F. de Paolis, G. Ingrosso and A. Nucita “**Microlensing signature of a white dwarf population in the galactic halo**”, **Int. Journ. Mod. Phys. D**, 2004;
- Robert Mochkovitch, Mimoza Hafizi “**On the duration-luminosity relation of GRB pulses during the prompt emission**”, **Nuovo cimento C**, 2005;
- Mimoza Hafizi, Robert Mochkovitch: “**Is the time lag-luminosity relation of GRBs a consequence of the Amati relation?**”, **Astronomy & Astrophysics**, 2007;
- Sonila Boçi, Mimoza Hafizi, Robert Mochkovitch, “**The lag and duration-luminosity relations of gamma-ray burst pulses**”, **Astronomy & Astrophysics**, 2010;
- Lindita Hamolli, Mimoza Hafizi, Francesco De Paolis, Achile Nucita, “**Parallax effects on microlensing events caused by free-floating planets**”, **Bulgarian Astronomical Journal**, 2013;
- Lindita Hamolli, Mimoza Hafizi, “**A theoretical calculation of microlensing signatures caused by free-floating planets towards the galactic bulge**”, **Int. Journ. Mod. Phys. D**, 2013;
- Lindita Hamolli, Mimoza Hafizi, Francesco De Paolis, Achile Nucita, “**Estimating finite source effects in microlensing events due to free-floating planets with the Euclid survey**”, **Advances in Astronomy**, 2015;
- Lindita Hamolli, Mimoza Hafizi, Francesco De Paolis, Achille A. Nuçita: “**Investigating the free-floating planet mass by Euclid observations**”, **Astrophysics & Space Science**, 2016;
- R. Mochkovitch, V. Heussaff, J.L. Atteia, S. Boçi and M. Hafizi, “**A simple theory of lags in gamma-ray bursts: Comparison to observations**”, **Astronomy & Astrophysics**, 2016.

YOUNG RESEARCHERS IN ASTROPHYSICS

Several diplomas during the years

About two diplomas each year

Some titles

- *THESEUS and GRB*
- *Microensing observations with two telescopes*
- *A study of Amati relation: internal relation or choice effect*
- *Temporal evolution of spectral parameters in GRB*

YOUNG RESEARCHERS ABROAD

Onelda Bardho, master of Tirana University 2009

PHD Nice University 2016

GRB

Floriana Zefi, master of Tirana University 2012

ongoing PHD studies in Ecole Polytechnique France

H. E. S. S experiment, one of the leading observatories studying very high energy gamma-ray astrophysics