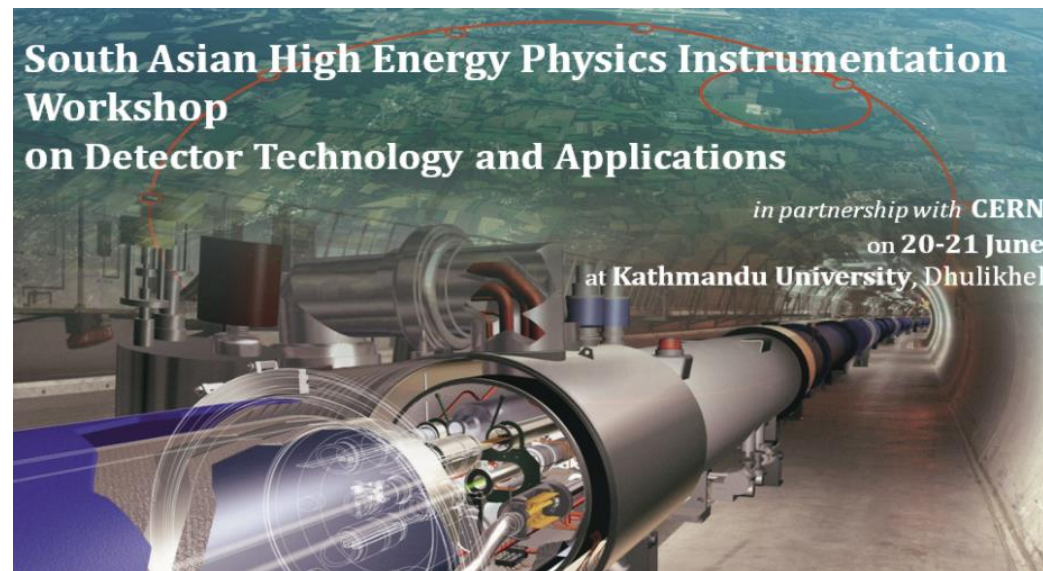




# Developing and sustaining Physics & Engineering Education and Research at Kabul University



By  
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On behalf of  
Physics Faculty,  
Kabul University

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## Background of Physics in Afghanistan academia

- **Physics department:** was established in 1942 at science faculty of Kabul University.
  - **Course offered:** Course offered by physics department.
  - Present members of physics Faculty
  - **Laboratories of physics department:** Mechanics laboratory, Electricity laboratory, Optics wave laboratory, Electronics laboratory, and Nuclear laboratory.
  - **Faculty of physics:** in 2016, physics department upgraded to faculty of physics.
- Departments of physics faculty:
- 1- Theoretical physics
  - 2- Nuclear and Atomic physics
  - 3- Electronics physics

## Present members of physics Faculty

Name	Duty	Educational Level
Prof. Zalmai Ahmadzi	Head of the faculty and department	MS.c
Prof. Karimullah Alamkhil	Head of department	MS.c
Prof. Freba Ahadyar	Head of department	MS.c
Prof. Rajab Ali Khawari	Academic member	MS.c
Asst. Prof. Roya Sadid	Academic member	MS.c
Asst. Prof. Abdulbari Bawari	Academic member	MS.c
Asst. Prof. Dr. Dawood Merzaee	Academic member	Ph.D
Asst. Prof. Jawad Ahmadi	Academic member	MS.c
Asst. Prof. Faizulrahman Ishaqzai	Academic member	MS.c
Asst. Prof. Ghazi Muhammad Andar	Academic member	BS.c
Asst. Prof. Baktash Amini	Academic member	BS.c
Asst. Prof. Ahmad Sajad Nazari	Academic member	BS.c
Asst. Prof. Rafiullah Sahebzada	Academic member	BS.c
Asst. Prof. Waligul Afghan	Academic member	BS.c

# Objectives of physics faculty of Afghanistan

Engage with Institutions of international repute for training, specialization and education in order to have:

- Research work and Development.
- High quality teaching at University and Schools

Building capacity for:

- all kinds of energy
- Afghan Commission of Atomic Energy
- ministry of petroleum
- authors to develop curriculum of schools in ministry of education in Afghanistan
- specialization in the field of Medicine, Diagnostics, and Radiology.
- Medical universities in Kabul- specialists in biophysics
- high school education

# SWOT analysis for physics in Afghanistan

## Strengths:

- Basic computing knowledge of teachers and students of physics faculty: Matlab , Visual basic, C #, and Ms Excel .
- Mathematical knowledge of teachers and students of physics faculty: Calculus, Real Analysis, Vector analysis, Deferential equations, Statistics, Mathematical methods of physics, and Function theory.
- Commitment of Faculty members to use simulation in research.
- Commitment of the faculty for bringing fundamental changes in teaching methods.
- Commitment of faculty to make curriculum for all three departments.
- Skills of Talented and promised young lecturers
- Dedication of young lecturers at physics faculty to make physics faculty stand out.
- Young lecturers have motive of conducting research project.
- Potential of talented and promised students with Innovative ideas

## Weaknesses:

- Lack of updated curriculum
- Lack of sufficient well qualified professors such as Masters' and PhDs' at physics faculty.
- Physics faculty doesn't have access to simulation codes.
- Lack of practical knowledge and lack of well equipped laboratories
- Lack of research centers for physics and hence no innovation in physics
- Lack of libraries with updated physics materials and books
- No contact with international journals
- No Relationship with universities of the region for exchanging academic knowledge

# SWOT analysis for physics in Afghanistan

## Opportunities

- Establishment of Masters' program in physics.
- Relationship with CERN.
- Work on simulation.
- Establishment of long term and short term workshops for enhancing knowledge of lecturers and students.
- Establishing an updated curriculum for all three department of physics faculty and High schools.
- Equipped Library and laboratories
- Research laboratory for conducting research
- Establishing a physics community for innovation and new inventions in research centers

## Threats

- Students of schools are less inclined to get admitted in science and specially in physics which may result in physics community getting less developed.

# Development of CERN-Afghan Relations

➤ since we do not have equipped laboratories, and in order to do research in physics we need to use simulation:

❑ Physics faculty needs these codes for simulation from CERN:

- Safety code for nuclear reactor
- MCNPX code
- Geant4 code for simulating, all particles of different energies.
- FLUKA code
- EGSnrc nuclear code

❑ Physics faculty needs Fellowships and workshops of simulation for:

- Lecturers of physics faculty.
- Talented students.

# Development of CERN-Afghan Relations

- **Training programs in Laboratories of India and Pakistan** – Long term training programs for Lecturers of physics faculty to do research work in the laboratories of India, Pakistan or other nearby countries.
- **Fellowships and workshops for teaching methodology**- Long term and short term programs for university lecturers and High school teachers to improve their teaching methods.
- **Physics faculty needs Support of CERN to make curriculum.**
- Physics faculty needs Support of CERN to have close relationships with universities of the region to exchange physics knowledge and update research data's.

## Physics faculty needs qualification Scholarships form CERN:

- Master's and PhD's scholarships for lecturers of physics faculty in order to fill the shortage of well qualified professor.
- Master's degree scholarships for talented students.



## Course offered

Class-1 (1 <sup>st</sup> Year) MPCB			
Semester-1		Semester-2	
Course No.	Title	Course No.	Title
1.1.1	Gen. Physics-1 (Mechanics, Heat)	1.2.1	Gen. Physics-2 (Geom. Optics, Elec. Mag.)
1.1.2	Mathematics	1.2.2	Mathematics
1.1.3	Chemistry	1.2.3	Chemistry
1.1.4	Biology	1.2.4	Biology
1.1.5	Computer	1.2.5	Computer
1.1.6	English	1.2.6	English
1.1.7	Islamic Culture	1.2.7	Islamic Culture
1.1.8	History	1.2.8	
Class-2 (2 <sup>nd</sup> Year)			
Semester-3		Semester-4	
2.3.1	Mechanics	2.4.1	Thermodynamics
2.3.2	Electricity & Magnetism	2.4.2	Wave Optics
2.3.3	Mathematics-1 (Real Analysis)	2.4.3	Mathematics-3 (Probability)
2.3.4	Mathematics-2 (Vector Analysis)	2.4.4	Mathematical Physics-1
2.3.5	Computer-1 (Spreadsheets)	2.4.5	Computer-2 (Programming in python)
2.3.6	Mechanics Lab.	2.4.6	Electricity Lab.
2.3.7	English	2.4.7	English
2.3.8	Islamic Culture	2.4.8	Islamic Culture



Class-3 (3 <sup>rd</sup> Year)			
Semester-5		Semester-6	
3.5.1	Statistical Physics	3.6.1	Semiconductor Devices
3.5.2	Solid State Physics	3.6.2	Classical Mechanics
3.5.3	Mathematical Physics-2	3.6.3	Atomic Physics
3.5.4	Computer-3 (Principles of Visual Programming)	3.6.4	Computer-4 ( Microprocessors and programming)
3.5.5	Optics Lab.	3.6.5	Microprocessors Lab.
3.5.6	Islamic Culture	3.6.6	Islamic Culture
Class-4 (4 <sup>th</sup> Year)			
Semester-7		Semester-8	
4.7.1	Nuclear Physics	4.8.1	Relativistic Mechanics
4.7.2	EM Theory	4.8.2	Quantum Mechanics
4.7.3	Analog & Digital Electronics	4.8.3	Transmission Lines and Electronic Communication
4.7.4	Computer-5 (Numerical Computational Techniques)	4.8.4	Computer-6 (Software Tools for Physics)
4.7.5	Electronics Lab.	4.8.5	Nuclear Lab.
4.7.6	Islamic Culture	4.8.6	Islamic Culture