

# Third PhD year report

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**Supervisor:** 1- Prof. Ali Asghar Mowlavi, Iran  
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**Graduate School:** Physics Department of Hakim Sabzevari University, Sabzevar,  
I.R. Iran. & Physics and Astrophysics Department of Turin  
University, Torino, Italy.

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## GRADUATE SCHOOL COURSES

**Title:** Radiation Dosimetry in physics and nuclear medicine

**Teacher:** Prof. Ali Asghar Mowlavi, Iran

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**Title:** Mont Carlo calculation in physics and nuclear medicine

**Teacher:** Prof. Ali Asghar Mowlavi, Iran

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**Title:** Advanced nuclear Physics

**Teacher:** Prof. Behnam Azadegan, Iran.

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**Title:** Radiation Detection

**Teacher:** Prof. Behnam Azadegan, Iran.

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**Title:** Heavy ion collisions

**Teacher:** Prof. Ahmad Farzaneh kord, Iran.

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## SUMMER SCHOOLS, INTERNATIONAL SCHOOLS

**Title:** XXV GIORNATE DI STUDIO SUI RIVELATORI

**Place:** Cogne (AO), Italy

**Webpage:** <http://www.gsr.unito.it/>

**Days:** 5 (21-26 February 2016)

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## CONFERENCES, WORKSHOP

**Title:** Radiation safety, Workshop.

**Place:** Physics Department of Hakim Sabzevari University, Sabzevar, Iran.

**Days:** 1 (20 April 2015)

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**Title:** Geant4 toolkit, Workshop.

**Place:** Physics Department of Hakim Sabzevari University, Sabzevar, Iran.

**Days:** 4 (10-13 May 2015)

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**Title:** MCNPX code, Monte Carlo simulation, Workshop.

**Place:** Physics Department of Hakim Sabzevari University, Sabzevar, Iran.

**Days:** 3 (5-8 November 2014)

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**Title:** Gravitational waves, Seminar.

**Place:** Dipartimento di Fisica, via Pietro Giuria, 1, Torino, Italy.

**Webpage:**<http://public.virgo-gw.eu>

**Days:** 1 (10 February 2016)

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## VISITS AND STAGES

**Institution:** National Centre of Oncology (CNAO)

**Place:** Pavia, Italy

**Starting date:** 15 April 2016

**Days:** 1

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**Institution:** National Centre of Oncology (CNAO)

**Place:** Pavia, Italy

**Starting date:** 14 July 2016

**Days:** 1

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**Institution:** National Centre of Oncology (CNAO)

**Place:** Pavia, Italy

**Starting date:** 10 December 2016

**Days:** 2

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## Publications

**Title:** Monte Carlo investigation of prostate cancer ion-therapy by using SOBP technique in GEANT4 toolkit and MCNPX code

**Authors:** S.M. Zabhipour ; **M. Fadavi Mazinani** ; S.A.Mahdipour. Physics Department of Hakim Sabzevari University, Sabzevar, I.R. Iran

**Journal:** Journal of advances in Physics. Vol.8, No. March 21, 2015

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**Title:** Design and characterization of a 64 channels ASIC front-end electronics for High -flux particle beam detectors

**Authors:** F. Fausti, G. Mazza , A. Attili, **M. Fadavi Mazinani**, S. Giordanengo, M. Lavagno, L. Manganaro, F. Marchetto, V. Monaco, R. Sacchi, A. Vignati, R. Cirio

**Journal:** Nuclear Instruments and Methods in Physics Research A 867,21(2017)1

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## Research activity

I have passed several courses in Physics Department of Hakim Sabzevari University and also made detailed presentations about those courses. I succeeded in a comprehensive doctoral exam. After study about my thesis subject (*Development of innovative tools to be used in the cure of cancer with Particle Therapy*) which was an agreement between two Universities, I studied deeply the physics of hadron therapy and provided a proposal that I defended.

I spent one year in Turin for some experiments from January 2016 until January 2017 .I continued my study about particle counting with UFSD and time measurements in the University of Turin. For few months I have worked on analysis of data collected by the simulation program Weightfield 2.0 which is able to give a detailed behavior of the UFSD electrical signals. I worked in laboratory to simulate UFSD's signals by pulse generator and also to test the UFSD with a laser beam. In each stage I have written programs with MATLAB to analyze data, in particular to test the following experimental methods: 1-(Constant fraction discriminator (CFD)). 2-(Cross correlation (CC)). 3-(-(Time over threshold (TOT)).

We prepared instruments to test the UFSD sensors on the proton beam of CNAO (National Centre of Oncological Hadron Therapy in Italy) and I analyzed real data from a previous CERN experiment to setup the CNAO analysis programs. We have

performed some experiments in CNAO and got good physics results. We can say that CFD method is the best for time measurement for UFSD's signals and that UFSD detectors are suitable to monitor therapeutic proton beams by directly counting the number of particles. The results of this test will soon be published in a peer-reviewed paper, after getting more data from other similar tests in CNAO.

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Sincerely yours  
**M.FADAVI**  
24 June 2017