Suleiman Baraka

Curriculum Vitae

"The happiness of the drop is to merge in the river" -
Al-Ghazzali

Education

2004–2007 **PhD in Astrophysics**, *Universitè Pierre et Marie Curie,* , Paris, France..
First Class Honor

2000-2003 **Master of Theoretical Physics**, *The Islamic University- Gaza*, Gaza.
Master thesis in Space Physics

1997–1998 **Grad Diploma**, *Penn State University*, State College,PA, USA.
HHH Fellowship

1983–1987 **B.Sc. Science : Major in Physics**, *Al Quds University*, Jerusalem.

PhD Thesis

Title *Study the interaction between the solar Wind and the Earth Magnetosphere :Theoretical Model and Applications for the Analysis of data of the Halloween Event of October 2003*

Supervisors Dr Hab. Lotfi Ben Jaffel

Description Research

Grad Diploma

Title *Public Administration : Governance and Negotiations*

Supervisors Prof Dr Sydure Rahman

Description Hubert Humphrey Program Fellowship

Master Thesis

Title *Study of the Onset of the Earth Magnetosphere under the Influence of the Solar Wind*

Supervisors Prof Dr Mohammed Shabat

Description Courses and Thesis

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B.Sc

Title *Black Holes Formation, Detection and Mathematical Applications*

Supervisors Prof Dr Fawzi Khalaf

Description Senior thesis

Experience

Academic, Outreach and Research

2012–Present **UNESCO chair, Astronomy, Astrophysics and Space Sciences in Palestine**, CHAIR-HOLDER, Palestine.

Detailed Activities

Outreach Stargazing and sky-watching by telescopes and projections of films. Activities held in public places, societies, cultural centers and Universities-Non Academic.

Teaching Introduction to Astronomy and Astrophysics-Academic at Educational institutions only.

Leadership Responsible for promoting and supporting all astronomical activities in Palestine.

Motivator Public Lectures for students and career seekers for how to make success stories not only in science and scientific research but in life as well.

2010–present **Center for Astronomy and Space Science**, AL-AQSA UNIVERSITY, Gaza, Founder and Director.

Detailed Activities

Researcher Carry out fundamental research in space physics in parallel with consultation with colleagues in different international institutions like NASA, ESA, CNES, and IAP-UMPC-CNRS.

Software Development Supervise developing and enhancing sophisticated graphic software for 3D magnetic field and particles plots using IDL.

Training Preparing graduate students to carry out research by introducing them to related softwares and scientific tools

Conferencing Regular participation in international conferences in space physics and numerical modeling such as AGU, EGU and GEM meetings.

Observation Introducing students to solar physics research by observational activities of the sun spots by f littered telescopes. Other activities for sky watching targeting physics students at University levels

Research Visits

August–2015 **Research**, *Royal Institute of Technology*, Stockholm, Sweden.
Workshop on Magnetic Reconnections and research group discussion. Contact Stefano Markidis

September–2015 **Research**, *Swedish Institute of Space Physics* , Uppsala, Sweden.
Comparing simulations to data within the Erasmus Mundus European Program : Contact Mats André and Andris Vavaids

October–2015 **Research**, *Laboratory of Physics of Plasmas*, Université Pierre et Marie Curie, Paris, France.
Working on Themis Data scripts and routines. Contact Olivier Le Contel

June–Dec.2015 **Research**, *National Institute of Aerospace*, Hampton, VA, USA.
Independent Research on Magnetosphere ionosphere with Bob Clauer Research Group.Europe Visits included in the total duration of time.Contact Bob Clauer

Teaching

2012–2014 **Introduction to Astronomy and Astrophysics**, *Alaqsa University*, Gaza, Palestine.
Astronomy is new discipline in our country. The course was aimed to 3rd year under graduate students to give them a broader view of what astrophysics and astronomy discipline is all about

August–2014 **Summer School**, *Notre Dam University*, Beirut.
MEARIM III regional summer school : Space Weather and related physics as a cutriculum and research theme

Miscellaneous

2001–2004 **Public Relations Officers**, *Palestinian National Authority*, Gaza.
Director of International Relations at commission for NGO

1999–2001 **Diplomat**, *Palestinian National Authority*, Gaza.
Desk Officer for Political affairs USA file at ministry of foreign affairs

1991–1998 **Public Relations Officer**, *Palestine Chamber of Commerce*, Gaza.
My major duties were, simultaneous translation[Arabic-English-Arabic], protocol manager, negotiator, direct contribution for setting up mutual agreements with international businesses and chamber of commerces

1988–1991 **School Teacher**, *Teacher in Girl-student institute for teachers*, Serte-Lybia.
Teacher

Supervision

Master Thesis Student Abdel Hafiz Bachtouti : The Earth's maagnetosphere interaction with the solar wind during southward inter- planetary magnetic field Ferhat Abbas, Setif, Algeria

Master Thesis Student Mahmoud Ayyad : Heavens and Earth perspective between Islamic Doctrine and Science Islamic University, Gaza, Palestine

Research Interests

1. I am interested in Space modeling namely the simulation of the interaction of the solar wind and the Earth magnetosphere. My research interests is in the field of Space Physics mainly to simulate the shock physics in the vicinity of the dayside magnetosphere.
2. Analytical study of the Earth Bow shock configuration during disturbed/ undisturbed Solar Wind flow during a steady flow of Northern Interplanetary Magnetic Field
3. Working on atypical events inside the inner magnetosphere during abrupt increase in Solar Wind dynamic pressure (compression of the magnetopause)
4. Cooperate with Cluster spacecraft team to simulate some of their selected events data
5. Comparing PIC code Modeling with Coordinated Commitee Modeling Center-CCMC supercomputed data

6. Study of dynamic processes inside cusp of the Earth during disturbances in solar wind dynamic pressure.
7. The dayside Magnetopause expansion/recovery and the analogy to Hot Flow Anomalies, analytical study
8. MMS, Cluster and Themis data comparison to Kinetic modeling using PIC EM Relativistic code
9. In new development of our work, Magnetosphere-Ionosphere- Magnetosheath coupling is being considered started in August 2015
10. Plasmasphere kinetics modeling

Publications and Conference presentations

1- S. Baraka, 2016. Large Scale Earth's Bow Shock with Northern IMF as simulated by PIC code in parallel with MHD model. ArXiv E-Prints.

2- S. Baraka and L. Ben-Jaffel. Impact of solar wind depression on the dayside magnetosphere under northward interplanetary magnetic field. Annales Geophysicae, 29 :31–46, Jan. 2011a. doi : 10.5194/angeo-29-31-2011.

3- S. Baraka and L. Ben-Jaffel. Sensitivity of the Earth's magnetosphere to solar wind activity : Three-dimensional macroparticle model. Journal of Geophysical Research (Space Physics), 112 :A06212, June 2007. doi : 10.1029/2006JA011946.

4- S. Baraka and L. Jaffel. Particle-In-Cell PIC 3D and MHD simulations of the Earth's Bow show. In A. Abbasi and N. Giesen, editors, EGU General Assembly Conference Abstracts, volume 14 of EGU General Assembly Conference Abstracts, page 6477, Apr. 2012.

5- S. M. Baraka and L. Ben Jaffel. Sensitivity of the Earth Magnetosphere to the Solar Wind Activity : 3D Macroparticle Model. AGU Spring Meeting Abstracts, page A3, May 2006.

6- S. M. Baraka and L. Ben-Jaffel. PIC EM Relativistic code is used to simulate the Earth bow shock. AGU Fall Meeting Abstracts, page A2032, Dec. 2011b.

7- S. M. Baraka and L. B. Ben-Jaffel. Earth's Magnetosphere 3D Simulation by Coupling Particle-In-Cell and Magnetohydrodynamics Models : Parametric Study. AGU Fall Meeting Abstracts, page A4222, Dec. 2014.

8- S. M. Baraka, L. B. Jaffel, and I. S. Dandouras. The unusual event of Jan 21st 2005 observed by Cluster spacecracts is considered for comparison by PIC EM Relativistic code simulation. AGU Fall Meeting Abstracts, page B2236, Dec. 2013.

Invited Talks

October 2015 3D Magnetosphere-Ionosphere Coupling Simulation by IAP Code, European Southern Observatory, ESO, Garching , Germany

February 2012 Why do we need Space Weather teaching and curriculum in the Arab World ,10th meeting of the Arab Union for Astronomy and Space Sciences, Muscat, Oman

November 2011 Can PIC EM Relativistic global code simulate the bow shock : Examples , Instituto de Astrofisica de Andaluciá, Granada, Spain

April 2007 Introduction to Space Weather , Cairo University, Egypt

January 2007 Example of Solar Wind Depression impact on Dayside Magentosphere , Centre d'Etude Environment Terrestres et Planetaires, Velizy, France

November 2006 Simulated depression of Solar wind inflow in the day side magnetopause as compared to HFA, Conference Magnetospheric Physics, Centre d'Etude Spatiale des Rayonnements, Toulouse, France

May 2006 2D plasma density depression impact on the magnetopause standoff distance , AGU-Joint Assembly, Baltimore, USA

Conference Talks

September 2014 MENA countries strategic need for space weather research, Beirut,Lebanon

December 2013 Kinetic Modeling, difficulties, challenges and aspiration, AGUFM 2013 , GEM focus group, San Francisco, US

June 2009 Comparison between MHD and PIC codes to simulate the jump condition in the dayside magnetosphere , Snowmass, Aspin, Colorado, USA

September 2005 Introduction to numerical simulation of the dayside magnetosphere, Lunar and Planetary Lab-Arizona University, USA

January 2005 Presentation on space simulation and solar wind-Earth magnetosphere interaction , Université Pierre et Mar Curie, Paris, France

July 2004 Presentation about Space Weather Simulation ,Akhawain University,Ifrane Morocco

Poster Presentations

Dec-2105 Magnetospheric Dynamical and Morphological Response to Multi-species Plasma Supply From the Ionosphere :New Comprehensive 3D PIC Simulation. , AGUFM, Abstract ID SM23B-2552 ,San Francisco, USA

Aug-2015 Study of the Sensitivity of Cusps to Pressure Gradients and IMF Orientation by PIC Code, Nordita Magnetic Reconnection Workshop, KTH, Stockholm, Sweden

Dec-2104 3D Simulation of the Earth's magnetosphere by Particle-In-Cell and Magnetohydrodynamics Models : parametric Study , AGUFM, Abstract ID SM41A-4222,San Francisco, USA

Dec-2013 Unusual event of Jan 21, 2005 observed by Cluster spacecraft is considered for comparison by PIC EM Relativistic code simulation , AGUFM , Abstract ID SM41B-2236, San Francisco, US

April-2012 Particle-In-Cell PIC 3D and MHD simulations of the Earth's Bow shock , Baraka, S and L. Ben Jaffel, EGU2012, Abstract ID EGU2012-6477 , Vienna,Austria

June-2009 Kinetic Modeling of the Earth ?s bow shock and Magnetopause , GEM annual meeting, Snowmass, Aspin, Colorado, USA

Nov-2004 PIC EM Relativistic Simulation of Solar wind- Magnetospheric interaction, Space Weather application , First European Week on Space Weather, ESTECNoordwijg, Holland

Awards

1996 Chevening Scholarship, Chesterfield, UK

1998 Hubert Humphrey Fellowship, Penn State University, PA,US

2004 PhD Scholarship,Government of France

2008 VT-NIA post-doc , NIA, Hampton,VA, US

2012 UNESCO chair-holder in Astronomy-Palestine

2013 Joint Franco-Palestinian Research Grant 20k Euros

2015 Bank of Palestine Grant , 4-month support to work in NASA.

2015 Erasmus Mundus IRFU, Uppsala University, Sweden.

2015 Invited Professor grant, UPMC,LPP, Paris, France.

Professional Membership

IAU International Astronomical Union since 2015

UNESCO Chair for Astronomy, Astrophysics and Space Sciences since 2012

EGU European Geophysical Union since 2011

AUASS Arab Union for astronomy and Space Sciences since 2007

AGU American Geophysical Union since 2005

Computer skills

Intermediate PYTHON, HTML,Vapor,VisIt,CISM, and R softwares

Advanced IDL,gnuplot, Latex, Fortran, Bibtex, Jabref, Zotero OpenOffice,Linux, Microsoft Windows,gimp, photoshop

Languages

Arabic	**Native Language**	
English	**Excellent**	*Proven fluency, reading and writing*
French	**Very Good**	*conversationally fluent*
Hebrew	**Very Good**	*conversationally fluent*

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References

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Robert Clauer National Institute of Aerospace, 100 ExplorationWay, Hampton, VA 23666 , rclauer@vt.edu. +1-757-325-6917

David G. Sibeck NASA Goddard Flight Center,Org Code : 674 NASA/GSFC Mail Code : 674, Greenbelt , MD 20771, Greenbelt, david.g.sibeck@nasa.gov . 1-301.286.5998

Ken-Ichi Nishikawa National Space Science & Technology Center, 320 Sparkman Drive ZP12 Huntsville AL 35805 United States, Ken-Ichi.Nishikawa-1@nasa.gov +1 256 961 7614

Douglas Stanley President and Executive Director,The National Institute of Aerospace, 100 Exploration Way, Hampton,VA, 23666 , stanley@nianet.org +1757 325-6811

Olivier Le Contel Laboratoire de Physique des Plasmas (LPP - UMR 7648) Couloir 24/34 - 5ème ètage Bureau 508 - case courrier 90 4, place Jussieu F-75252 Paris Cedex 05, olivier.lecontel@lpp.polytechnique.fr. +33 1 4427 9253

Communication Skills

* Proven Ability to work under heavy pressure of work with a constant attention on output quality
* Public Speaking Abilities and master of ceremony experience
* Conflict resolution and negotiation skills
* Excellent Computer skills in professional, technical and research
* Experienced in adaptivity, I had succeeded to work under incomparable enivoronment of interruptions and power outage problems
* Mastermind all related softwares that research qualities require
* Leadership qualities to inspire, lead, supervise and motivates students
* Interpersonal skills to inspire peers and give advices and insights instantly with learnig new things.

PhD Abstract

New approach, using a $3\mathrm{D}$ Electromagnetic Particle-In-Cell (PIC) code, is presented to study the sensitivity of the Earth's magnetosphere to the variability of the solar wind bulk velocity. Starting with a solar wind impinging upon a magnetized Earth, time was let to the system so a steady state structure of the magnetosphere was attained. Then an impulsive disturbance was applied to the system by changing the bulk velocity of the solar wind to simulate a depression in the solar wind dynamic pressure, for zero, southward and northward interplanetary magnetic field (IMF). As a result of the applied disturbance, an air pocket effect that could be described as a $\sim 15R_E$wide gap is formed for all cases of IMF condition. As soon as the gap hit the initial bow shock of the steady magnetosphere, a reconnection between the Earth's magnetic field and the southward IMF was noticed at the dayside magnetopause (MP). During the expansion phase of the system, the outer boundary of the dayside magnetopause broke up in the absence of the IMF, yet it sustained its bullet shape when a southward and a northern IMF were included. The time relaxation of the MP for the three IMF cases was studied. The code is then applied to study the Halloween event of October 2003. Our simulation produced a new kind of air pocket, a rarefied space that was generated following a strong gradient in the impinging IMF. Such a feature is quite similar to observed hot flow anomalies and may have the same origin

PhD Committee Report (Originally in French)

Devant un jury de l'Université Pierre et Marie Curie – Paris VI ***Monsieur Baraka*** a présenté l'ensemble de ses travaux de thèse en quarante cinq minutes. Ses travaux ont porté sur la mise en oeuvre, le test et l'utilisation d'un code « particle in cell » développé par O. Buneman pour décrire à l'échelle globale le couplage vent solaire/magnétosphère. Ions et électrons y sont traités de façon cinétique, ce qui a l'avantage de fournir en principe une description complète du système, et l'inconvénient – ou la complexité – de fournir en retour une quantité de données brutes considérable. Monsieur Baraka s'est concentré sur l'analyse morphologique d'un phénomène particulier, l'interaction de la face diurne de la magnétosphère avec une raréfaction de pression se propageant dans le vent solaire. Il en a étudié les caractéristiques pour trois valeurs différentes de la composante nord-sud du champ magnétique interplanétaire.La présentation orale de Mr. Baraka a été dynamique et captivante, et très bien illustrée, nous faisant parcourir pas à pas les principales étapes de sa démarche. Elle s'est conclue sur un énoncé clair des résultats obtenus, et des perspectives nombreuses de poursuite et d'approfondissement de ce travail, qui apporte indiscutablement un outil intéressant à la physique magnétosphérique. Les questions, assez nombreuses, ont beaucoup porté sur l'interprétation physique des résultats obtenus, éclairant les nombreuses pistes d'analyse des résultats numériques qui devront être explorées dans l'avenir. Le jury, au cours de sa délibération, a unanimement apprécié l'impressionnante quantité de travail accompli, et l'intérêt des résultats déjà obtenus. Il encourage Mr. Baraka, si les possibilités lui en sont données comme il le souhaite, à poursuivre l'exploitation de cet outil en sélectionnant quelques sujets plus focalisés d'interprétation physique des résultats obtenus, et en exploitant pleinement la précieuse information sur l'état cinétique des différentes populations de particules que le code fournit. Il souhaite de tout coeur à Mr. Baraka plein succès dans la poursuite de ses projets de recherches. Il a noté avec beaucoup d'intérêt le caractère exemplaire de l'accomplissement de ce travail dans le contexte de la coopération scientifique entre la France et la Palestine.

Après avoir délibéré, le jury a décerné à l'unanimité à Monsieur Baraka le titre de Docteur de l'Université Pierre et Marie Curie, avec mention très honorable

Michel Blanc , *Toulouse, le 29 mars 2007.*