

# Curriculum Vitae

## Ghassan Antar

### Personal Data

Name last, first, middle: Antar, Ghassan, Youssef  
Date of Birth: November 29, 1965  
Nationalities: Lebanese and French  
Married and has four children.

#### Home address

Mar Nouhra Church quarter  
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#### Professional address

Associate Professor  
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### Employment

**2010-to-date** American University of Beirut, Lebanon  
*Associate Professor, the Physics Department*

**2007-to-date** American University of Beirut, Lebanon  
*Assistant Professor, the Physics Department*

**2006-2007** Max-Planck Institut für Plasmaphysik, Garching, Germany  
*Visiting Scientist*

- Installation of a fast imaging camera on the ASDEX-Upgrade tokamak.
- Investigation of disruption mitigation.
- Imaging plasma turbulence and coherent modes and study their properties.

**2005-2006** University of California, San Diego, USA  
*Assistant Research Scientist Step IV*

- Study of edge localized modes on the DIII-D tokamak using imaging.
- Investigation of the penetration of gas jets in the plasma by numerical simulation and imaging.
- Imaging plasma turbulence and coherent modes and study their properties in linear devices.

**2003-2004** University of California, San Diego, USA  
*Assistant Project Scientist Step III*

- Investigation of the origin of intermittency on the PISCES linear plasma device.
- Contribution to disruption mitigation in tokamaks by massive gas jets.

**2002-2003** University of California, San Diego, USA  
*Assistant Project Scientist Step II*  
- Investigation of plasma edge turbulence properties in confinement devices.  
- Conduct the first large-scale plasma liquid lithium experiment.  
- Study of plasma turbulence using the electron cyclotron emission in Tore Supra.  
- Characterizing edge localized modes on the MAST tokamak.

**2000-2001** University of California, San Diego, USA  
*Post-graduate Scientist Step X*  
- Responsible for the upgrade of the linear plasma device PISCES.  
- Investigation of the plasma edge properties.  
- Showing for the first time that intermittency in the plasma edge is non-local coming from the plasma center. The name “avaloids” was given and is presently been used by other researchers.

**1998-1999** CEA-Cadarache, France  
*Post-graduate Scientist*  
- Investigation of turbulence properties by collective light scattering.  
- Responsible of ALTAIR, the collective light scattering installed on Tore Supra.  
- Investigation of high-confinement modes obtained on Tore Supra.  
- Characterizing the plasma edge using electrical probes on Tore Supra.

**1997** Ecole Polytechnique, France  
*Post-graduate Scientist*  
- Investigation of the transition to turbulence of a plane-Couette flow.  
- Turbulent transport by collective light scattering on the Tore Supra tokamak.

**1992** Ecole Supérieure de Physique et de Chimie Industrielles, France  
*Post-graduate Research Assistant*  
- Characterization of quaternary semiconductor alloy type GaAsInSd.  
- Work in the library of Henri Poincaré Institute.

## Education

**1994-1996** Ecole polytechnique, France  
PhD in Physics  
Title: Observation of small-scale turbulent fluctuations using collective light scattering.

**1993** Université Paris VI, France  
Diploma of Advanced Studies in Laser & Matter Interaction.

**1991** Université Paris XI, France  
Attended all of the last year classes of Master of Science (Maîtrise) following a two-year period when studies were completely interrupted.

**1984-1990** Université libanaise, Lebanon  
Master of Science in Fundamental Physics (studies interrupted in the period 1989 -1990 because of the war).

## Professional Data

- Recipient of the NATO scholarship in 1997 to study experimentally plane Couette Flows transition to turbulence.
- Recipient of Hariri Foundation Scholarship for graduate studies (1995) at Ecole Polytechnique (France).
- Languages:  
Fluent in Arabic, French, English and good knowledge of German.
- Referee for International Journals: Physics of Plasmas, Physical Review Letters, Plasma Physics and Controlled Fusion, Nuclear Fusion & Le Journal Scientifique Libanais

## Research Expertise

- Neutral fluid dynamics, instabilities and turbulence.
- Sub and supersonic gas dynamics.
- Non-linear dynamical systems, chaos and fractal theory.
- Plasma dynamics, instabilities and turbulence.
- Physics of controlled thermonuclear fusion.
- Diagnostics feasibility study and setup for plasmas and fluids.
- Signal processing and statistical data analysis of images and time series.
- Simulations and computer programming in MATLAB, MAPPLE, LabView and MDS+.

## REFEREED JOURNAL ARTICLES

1. G. Antar, F. Gervais, P. Hennequin, A. Quéméneur, R. Sabot, A. Truc, P. Devynck, C. Fenzi, X. Garbet, C. Laviron, *Statistical Study of density Fluctuations on Tore Supra Tokamak*, Plasma Physics and Controlled Fusion **6**, 947-966 (1998).
2. G. Antar, P. Devynck, C. Laviron, X. Garbet, P. Hennequin, A. Truc, R. Sabot, C. Fenzi, C. Honoré, F. Gervais, A. Quéméneur, *Temporal Separation of the Light Scattering Signals and its Consequence on the Determination of Turbulent Properties*, Plasma Physics and Controlled Fusion **6**, 733-746 (1999).
3. C. Fenzi, P. Devynck, A. Truc, X. Garbet, H. Capes, C. Laviron, G. Antar, F. Gervais, P. Hennequin, A. Quéméneur, *Up-down asymmetries of density fluctuations in Tore Supra*, Plasma Physics and Controlled Fusion **8**, 1043-1048 (1999).
4. Deng Zhongchao, G. Antar, D. Gresillon, *Observation of Freestream Turbulence using Collective light Scattering in the Visible Range*, Chinese Journal of Lasers **26**, 497 (1999).
5. X. Garbet, C. Fenzi, P. Devynck, H. Cappes, G. Antar, *Kelvin-Helmholtz Instability and Edge Turbulence*, Phys. Plasmas **6**, 3955-3965 (1999).
6. G. Antar, *Visible Light Scattering Measurements of Turbulence Small Scales*, Rev. Sci. Instrum. **71**, 113-117 (2000).
7. G. Wang, G. Antar, P. Devynck, *The Hurst Exponent and the Long-time Correlation*, Phys. Plasmas **7**, 1181-1183 (2000).
8. G. Y. Antar, P. Devynck, G. D. Wang, *Response to "Comments on the 'Hurst exponent and long time correlation'"*, Phys. Plasmas **7**, 5269-5271 (2000).
9. G. T. Hoang, C. Bourdelle, X. Garbet, G. Antar, R. V. Budny, T. Aniel, V. Basiuk, A. Bécoulet, P. Devynck, J. Lasalle, G. Martin, F. Saint-Laurent, *Internal Transport Barrier with Ion-Cyclotron-Resonance Minority Heating on Tore Supra*, Phys. Rev. Lett. **84**, 4593-4596 (2000).
10. P. Devynck, G. Y. Antar, G. Wang, X. Garbet, J. P. Gunn, J. Y. Pascal, *Shear effect on the radial profile of fluctuations measured by a reciprocating Langmuir probe in Tore Supra*, Plasma Physics and Controlled Fusion **3**, 327-335 (2000).
11. G. Y. Antar, G. T. Hoang, P. Devynck, X. Garbet, C. Laviron, M. Goniche, *Turbulence Suppression during Reversed Shear Plasma on Tore Supra*, Phys. Plasmas **8**, 186-192 (2001).

12. E. M. Hollmann, G. Y. Antar, R. P. Doerner, S. C. Luckhardt, *Omegatron mass spectrometer for analysis of ion concentration in hydrogenic plasmas*, Rev. Sci. Instrum. **72**, 623-626 (2001).
13. Liebscher, S. C. Luckhardt, G. Y. Antar, S. Zweben, *A fast phosphor imaging diagnostic for two-dimensional plasma fluctuations*, Rev. Sci. Instrum. **72**, 953-956 (2001).
14. G. Antar, P. Devynck, X. Garbet, S. C. Luckhardt, *Turbulence Intermittency and Bursts Properties in the Scrape-off layer of the Tore Supra Tokamak*, Phys. Plasmas **8**, 1612-1624 (2001).
15. G. Y. Antar, S. I. Krasheninnikov, P. Devynck, R. P. Doerner, E. M. Hollmann, J. A. Boedo, S. C. Luckhardt, R. W. Conn, *Experimental Evidence of Convective Transport in Fusion Devices*, Phys. Rev. Lett. **87**, 065001 (2001).
16. J. A. Boedo, D. Rudakov, R. Moyer, S. Krasheninnikov, D. Whyte, G. McKee, G. Tynan, M. Schaffer, P. Stangeby, P. West, S. Allen, T. Evans, R. Fonck, E. Hollmann, A. Leonard, A. Mahdavi, G. Porter, M. Tillack and G. Antar, *Transport by intermittent convection in the boundary of the DIII-D tokamak*, Phys. Plasmas **8**, 4826-4833 (2001).
17. P. Devynck, J. Gunn, Ph. Ghendrih, X. Garbet, G. Antar, P. Beyer, C. Boucher, C. Honore, F. Gervais, P. Hennequin, A. Quémeneur and A. Truc, *Density fluctuations at high density in the ergodic divertor configuration of Tore Supra*, Journal of Nuclear Materials **290**, 584-587 (2001).
18. G. Y. Antar, R. P. Doerner, R. Kaita, R. Majeski, J. Spoleta, T. Munsat, B. Jones, R. Maingi, V. Soukhanovskii, H. Kugel, J. Timberlake, S. I. Krasheninnikov, S. C. Luckhardt, R. W. Conn, *Plasma-Lithium Interaction in the CDX-U Spherical Torus*, Fusion Energy and Design, **60**, 157-166 (2002).
19. G. Y. Antar, P. Devynck, C. Fenzi, *Non-local k-space and interaction and the rare existence of coherent structures in the tokamak edge plasma*, Phys. Plasmas **9**, 1255-1261 (2002).
20. D. L. Rudakov, J. A. Boedo, R. A. Moyer, S. Krasheninnikov, A. W. Leonard, M. A. Mahdavi, G. R. McKee, G. D. Porter, P. C. Stangeby, J. G. Watkins, W. P. West, D. G. Whyte and G. Antar, *Fluctuation-driven transport in the DIII-D boundary*, Plasma Phys. Control. Fusion **44**, 717-731 (2002).
21. P. Devynck, X. Garbet, Ph. Ghendrih, J. Gunn, C. Honore, B. Pégourié, G. Antar, A. Azeroual, P. Beyer, C. Boucher, V. Budaev, H. Capes, F. Gervais, P. Hennequin, T. Loarer, A. Quémeneur, A. Truc and J.C. Vallet, *Edge turbulence during ergodic divertor operation in Tore Supra*, Nucl. Fusion **42**, 697-707 (2002).

22. R. Kaita, R. Majeski, M. Boaz, P. Efthimion, B. Jones, D. Hoffman, H. Kugel, J. Menard, T. Munsat, A. Post-Zwicker, V. Soukhanovskii, J. Spaleta, G. Taylor, J. Timberlake, R. Woolley, L. Zakharov, M. Finkenthal, D. Stutman, G. Antar, R. Doerner, S. Luckhardt, R. Maingi, M. Maiorano and S. Smith, *Spherical torus plasma interactions with large-area liquid lithium surfaces in CDX-U*, Fusion Engineering and Design, 61-62, 217-222 (2002).
23. G. Y. Antar, S. Bottin, O. Dauchot, F. Daviaud, P. Manneville, *Details on the Intermittent Transition to Turbulence of a Locally Forced Plane Couette Flow*, Experiments in Fluid, 34, 324-341 (2003).
24. R. Majeski, M. Boaz, D. Hoffman, B. Jones, R. Kaita, H. Kugel, T. Munsat, J. Spaleta, V. Soukhanovskii, J. Timberlake, L. Zakharov, G. Antar, R. Doerner, S. Luckhardt, R. W. Conn, M. Finkenthal, D. Stutman, R. Maingi and M. Ulrickson, *CDX-U operation with a large area liquid lithium limiter*, Journal of Nuclear Materials, 313-316, 625-629 (2003).
25. R. Majeski, M. Boaz, D. Hoffman, B. Jones, R. Kaita, H. Kugel, T. Munsat, J. Spaleta, V. Soukhanovskii, J. Timberlake, L. Zakharov, G. Antar, R. Doerner, S. Luckhardt, R. W. Conn, M. Finkenthal, D. Stutman, R. Maingi and M. Ulrickson, *Plasma performance improvements with liquid lithium limiters in CDX-U*, Fusion Engineering and Design, 65, 443-447 (2003).
26. G. Y. Antar, G. Counsell, Y. Yu, B. LaBombard and P. Devynck, *On the Universality of Intermittent Convective Transport in Magnetically Confined Devices*, Phys. Plasmas, 10, 419-458 (2003).
27. N. P. Basse, S. Zoletnic, G. Y. Antar, J. Baldzuhn, A. Werner and W7-AS Team, *Characterization of turbulence in L- and ELM-free H-mode Wendelstein 7-AS plasmas*, Plasma Physics and Controlled Fusion, 45, 439-453 (2003).
28. G. Y. Antar, *On the Origin of Intermittency in Magnetically Confined Devices*, Phys. Plasmas, 10, 3629-3634 (2003).
29. G. Y. Antar, *Kolmogorov-Kraichnan Scaling in the Inverse Energy Cascade of Two-dimensional Plasma Turbulence*, Phys. Rev. Lett., 91, 055002 (2003).
30. R. J. Akers, J. W. Ahn, G. Y. Antar, L. C. Appel, and the MAST and NBI Team, *Transport and confinement in the Mega Ampère Spherical Tokamak (MAST) plasma*, Plasma Physics and Controlled Fusion, 45, A175-A204 (2003).
31. G. Tynan, M. Burin, C. Holland, G. Antar, N. Crocker and P. H. Diamond, *Radially sheared Azimuthal flows and turbulent transport in a cylindrical helicon plasma device*, Phys. Plasmas, 11, 5195 (2004).
32. G. Y. Antar, *On the existence and universality of convective structures in magnetically confined devices*, Contributions to Plasma Physics, 44, 217-221 (2004).

33. G. Tynan, M. Burin, C. Holland, G. Antar, *Radially Sheared Azimuthal Flows and Turbulent Transport in a Cylindrical Helicon Plasma Device*, Plasma Physics and Controlled Fusion, 46, A373-A379 (2004).
34. Majeski R, Kaita R, Boaz M, Efthimion P, Gray T, Jones B, Hoffman D, Kugel H, Menard J, Munsat T, Post-Zwicker A, Spaleta J, Taylor G, Timberlake J, Woolley R, Zakharov L, Finkenthal M, Stutman D, Antar G, Doerner R, Luckhardt S, Seraydarian R, Maingi R, Maiorano M, Smith S, Rodgers D, Soukhanovskii V, *Testing of liquid lithium limiters in CDX-U*, Fusion Engineering and Design 72, 121-132, (2004).
35. G. Y. Antar, G. Counsell, Y. Yu, J.-W. Ahn, M. Price, A. Tabasso and A. Kirk, *The poloidal distribution of turbulent fluctuations and avaloids in the Mega Ampère Spherical Tokamak (MAST)*, Physics of Plasmas, 12, 032506-032517 (2005).
36. G. Y. Antar, G. Counsell, J.-W. Ahn, *On the scaling of avaloids and turbulence with the average density approaching the density limit*, Phys. Plasmas 12, 082503-082514 (2005).
37. Majeski R, Jardin S, Kaita R, Gray T, Marfuta P, Spaleta J, Timberlake J, Zakharov L, Antar G, Doerner R, Luckhardt S, Seraydarian R, Soukhanovskii V, Maingi R, Finkenthal M, Stutman D, Rodgers D, Angelini S, *Recent liquid lithium limiter experiments in CDX-U*, Nuclear Fusion 45, 519-523 (2005).
38. Kaita R, Majeski R, Boaz M, Efthimion P, Gettelfinger G, Gray T, Hoffman D, Jardin S, Kugel H, Marfuta P, Munsat T, Neumeyer C, Raftopoulos S, Soukhanovskii V, Spaleta J, Taylor G, Timberlake J, Woolley R, Zakharov L, Finkenthal M, Stutman D, Delgado-Aparicio L, Seraydarian RP, Antar G, Doerner R, Luckhardt S, Baldwin M, Conn RW, Maingi R, Menon M, Causey R, Buchenauer D, Ulrickson M, Jones B, Rodgers D, *Effects of large area liquid lithium limiters on spherical torus plasmas*, Journal of Nuclear Materials 337 (1-3), 872-876 (2005).
39. G. Y. Antar, *The Poloidal Distribution of type-III Edge Localized Modes in MAST*, Physics of Plasmas 13, 052508-052516 (2006).
40. G. Y. Antar, J. Yu and G. Tynan, *On the origin of avaloids in the CSDX linear plasma device investigated by fast imaging*, Phys. Plasmas 14 022301 (2007).
41. L.R. Baylor, T.C. Jernigan, P.B. Parks, G. Antar, N.H. Brooks, S.K. Combs, D.T. Fehling, C.R. Foust, W.A. Houlberg and G.L. Schmidt, *Comparison of deuterium pellet injection from different locations on the DIII-D tokamak*, Nucl. Fusion 47 1598-1606 (2007).

42. R. Pugno, M.J. Baldwin, R.P. Doerner, J. Hanna, D. Nishijima, G. Antar, *Surface effects on graphite samples exposed to beryllium-seeded plasmas under transient power load on PISCES-B*, Journal of Nuclear Materials, 363-365, 1277-1282 (2007).
43. D.L. Rudakov, W.P. West, C.P.C. Wong, N.H. Brooks, T.E. Evans, M.E. Fenstermacher, M. Groth, S.I. Krasheninnikov, C.J. Lasnier, A.G. McLean, A.Yu. Pigarov, W.M. Solomon, G. Y. Antar, J.A. Boedo, R.P. Doerner, E.M. Hollmann, A.W. Hyatt, R.A. Moyer, J.G. Watkins, *Migration of artificially introduced micron-size carbon dust in the DIII-D divertor*, Journal of Nuclear Materials, 363-365, 227-232 (2007).
44. J.H. Yu, C. Holland, G.R. Tynan, G. Antar, Z. Yan, *Examination of the velocity time-delay-estimation technique*, Journal of Nuclear Materials, 363-365, 728-732 (2007).
45. E. M. Hollmann, T. C. Jernigan, E. J. Strait, G. Antar, T. E. Evans, D. S. Gray, M. Groth, D. A. Humphreys, P. B. Parks, and D. G. Whyte, *Observation of q-profile dependence in noble gas injection radiative shutdown times in DIII-D*, Phys. Plasmas 14, 012502 (2007).
46. R.S. Granetz, E.M. Hollmann, D.G. Whyte, V.A. Izzo, G.Y. Antar, A. Bader, M. Bakhtiari, T. Biewer, J.A. Boedo, T.E. Evans, I.H. Hutchinson, T.C. Jernigan, D.S. Gray, M. Groth, D.A. Humphreys, C.J. Lasnier, R.A. Moyer, P.B. Parks, M.L. Reinke, D.L. Rudakov, E.J. Strait, J.L. Terry, J. Wesley, W.P. West, G. Wurden and J. Yu *Gas jet disruption mitigation studies on Alcator C-Mod and DIII-D*, Nucl. Fusion 47 1086-1091 (2007).
47. D Borodin, A Kirschner, S Droste, R Doerner, D Nishijima, M Baldwin, A Pigarov, E Hollmann, Gh Antar, R Serayderian, V Philipps, Ph Mertens and U Samm, *Modelling of chemical erosion mitigation experiments at PISCES-B using the 3D Monte-Carlo code ERO*, Phys. Scr. T128 127-132 (2007).
48. M. Rajkovic, M. Skoric, K. Solna and G. Antar, *Characterization of local turbulence in magnetic confinement devices*, Nuclear Fusion 48, 024016-024029 (2008).
49. G Y Antar, M Tsalas, E Wolfrum, V Rohde and the ASDEX Upgrade Team, *Turbulence during H- and L-mode plasmas in the scrape-off layer of the ASDEX Upgrade tokamak*, Plasma Phys. Control. Fusion 50 095012-095019 (2008).
50. G.Y. Antar, S.I. Krasheninnikov, P.B. Snyder, R.A. Moyer, R. Pugno and D.S. Gray, *On the onset of type I edge localized modes*, Nucl. Fusion 49 032001-032006 (2009). **[This Letter was selected as one of the highlights in Nuclear Fusion for 2009]**

51. H. Zohm, J. Adamek, C. Angioni, G. Antar, C.V. Atanasiu, M. Balden, W. Becker, K. Behler, K. Behringer, A. Bergmann, T. Bertoncelli, et al., *Overview of ASDEX Upgrade results*, Nucl. Fusion 49 104009 (2009).
52. J. Adamek, C. Angioni, G. Antar, C. V. Atanasiu, M. Balden, W. Becker et al. *Addendum to papers from Axially Symmetric Divertor Experiment (ASDEX) Upgrade Team*, Rev. Sci. Instrum. **81**, 039903 (2010).
53. G. Antar, S. Assas, V. Bobkov, J.-M. Noterdaeme, E. Wolfrum, A. Herrmann, and V. Rohde (ASDEX Upgrade Team), *Convective Transport Suppression in the Scrape-Off Layer Using Ion Cyclotron Resonance Heating on the ASDEX Upgrade Tokamak*, Phys. Rev. Lett. **105**, 165001 (2010)

## Grants & Contracts

1. US Department of Energy (No. DE-FG03-95ER-54301) 2003, G. Antar & the PISCES group, contribution to the grant renewal at the level of approximately 20%. The grant allowed funding at a level of 1.8 million dollars per year.
2. US Department of Energy (DE-FG02-04ER-54758) 2003, G. Antar & the PISCES group, Contributed to the grant renewal at the level of approximately 20%. The grant allowed funding at a level of 0.45 million dollars per year.
3. US Department of Energy (DE-FC02-04ER54698) 2004, G. Antar & the PISCES group, *I proposed and installed a fast imaging camera on the DIII-D tokamak in a record time.*
4. UCSD-CEA-Cadarache 2003-2004, G. Antar & M. Goniche, a proposal was approved for a collaborative with the Tore Supra team on *the usage of the electron cyclotron emission to measure turbulent fluctuations in the core of the tokamak.*
5. Max-Planck Institut and Euratom 2006, G. Antar & V. Rohde, a proposal to the EU-Euratom was approved funding *the installation a fast imaging camera on the ASDEX-Upgrade tokamak.*
6. Max-Planck Institut fur Plasmaphysik and the CEA-Cadarache 2006, G. Antar, M. Goniche & S. Assas, *a proposal to conduct collaborative research was approved by to conduct joined research on the effect of ICRH on the plasma edge.*
7. University Research Board (URB) 2007-2008, G. Antar, *quasi-2D coherent vortices dynamics*, \$7,000.
8. Faculty of Arts and Science Dean's office 2007-2008, G. Antar, *building a linear plasma device at AUB*, \$30,000.

9. Centre National de la Recherche Scientifique Libanais (CNRSL) 2007-2008, M. Tabbal, G. Antar & M. Roumieh, *Experiments on liquid gallium and quasi-2D dynamics*, \$6,500.
10. University Research Board (URB) 2008, G. Antar, *Long-term faculty development grant from the university research board for a stay of one month at the Max-Planck Institut fur Plasmaphysik*.
11. University Research Board (URB) 2008-2009, G. Antar, *Coherent Vortices in Quasi-2D Flows Generated by Electromagnetic Forces*, \$5,146.
12. University Research Board (URB) 2009-2010, G. Antar, *Coherent Vortices in Quasi-2D flows in Liquid Gallium and electrolytes*, \$5,500.
13. Coopération pour l'Evaluation et le Développement de la Recherche (CEDRE), *Etude de la turbulence bidimensionnelle dans les plasmas et des effets non-linéaires au cours de la propagation d'ondes de haute fréquence*, submitted in collaboration with the CEA-Cadarache (France), \$25,000
14. KAUST faculty collaborative funding, *The Various Facets of Quasi-two-dimensional Turbulence Investigated Using Numerical Simulation*, in collaboration with Drs. I. Hoteit, M. Darwishz, L. Klushin, R. Smataney, and M. Ottaviani, Not funded
15. University Research Board (URB) 2011-2012, G. Antar, *Coherent Vortices in Quasi-2D flows in Liquid Gallium*, \$7,000.
16. Munib R. and Angela Masri Institute of Energy and Natural Resources, Not funded

## Conferences and Proceedings

1. 2002, 6th International Symposium on Fusion Nuclear Technology, San Diego (USA), R. Kaita, R. Majeski, M. Boaz, P. Efthimion, B. Jones, H. Kugel, J. Menard, T. Munsat, A. Post-Zwicker, V. Soukhanovskii, J. Spaleta, G. Taylor, J. Timberlake, R. Woolley, L. Zakharov, M. Finkenthal, D. Stutman, G. Antar, R. Doerner, S. Luckhardt, R. Maingi, B. Miller, S. Smith, *Spherical Torus plasma interaction with large-area liquid lithium surfaces in CDX-U*.
2. 2002, IAEA Fusion Energy Conference, Lyon (France) R. Kaita, R. Majeski, R. Doerner, G. Antar, M. Baldwin, R. Conn, P. Efthimion, M. Finkenthal, D. Hoffman, B. Jones, S. Krashenninikov, Kugel, S. Luckhardt, R. Maingi, J. Menard, T. Munsat, D. Stutman, Taylor, J. Timberlake, V. Soukhanovskii, D. Whyte, R. Woolley, L. Zakharov, *Liquid Lithium Limiter Effects on Tokamak Plasmas and Plasma-Liquid Surface Interactions*.
3. 2004, EC-13 Workshop, Nizhny Novgorod (Russia), J.-L. Segui, D. Molina, M. Goniche, G. Y. Antar, P. Maget, V. Udintsev, A. Kramer-Flecken, *Upgraded of the ECE radiometer on the Tore Supra Tokamak*.
4. H. Zohm, J. Adamek, C. Angioni, G. Antar, C.V. Atanasiu, M. Balden, F. Volpe et al, *Overview of ASDEX Upgrade*, Results Proc.22nd IAEA Fusion Energy Conf., Geneva (Switzerland), 13-18 October 2008, paper OV/2-3.

## Abstracts of non-refereed Conference Proceedings

1995, Vth Conference on Laser Velocimetry, Poitiers (France)  
G. Antar, D. Grésillon, Z.C. Deng, *Velocity Measurements by Collective Light Scattering*.

1996, SFP Conference, Marseille (France)  
G. Antar and D. Grésillon, *Temporal characteristics of Small-scales Turbulence in Free Air-jet*.

1998, EPS meeting, Prague (Czech Republic)

- P. Devynck, G. Antar, X. Garbet, A. Grosmann, J.Y. Pascal, *Measurements of Fluctuations Profiles with a Langmuir Probe in Limiter and Ergodic Divertor Configurations of Tore Supra*.
- C. Fenzi, P. Devynck, A. Truc, X. Garbet, H. Capes, C. Laviron, G. Antar, F. Gervais, P. Hennequin, A. Quéméneur, *Analysis of Up-down Asymmetries of Density Fluctuations on Tore Supra*.
- C. Honoré, R. Sabot, P. Hennequin, F. Gervais, A. Quéméneur, A. Truc, G. Antar, P. Devynck, C. Fenzi, X. Garbet, C. Laviron, *Small-scale Density Fluctuations in Tore-Supra: Rupture in the Scaling Law*.

1999, European TTF Workshop, Padova (Italy) G. Antar, C. Laviron, X. Garbet, P. Devynck, P. Hennequin, A. Truc, R. Sabot, C. Fenzi, F. Gervais, A. Quéméneur, *Small Scales of Turbulence in Tore Supra Measured by Light Scattering*.

1999, TTF Workshop, Portland (USA)

- C. Fenzi, X. Garbet, A. Truc, G. Antar, P. Devynck, F. Gervais, P. Hennequin, C. Laviron, A. Quéméneur, *Characterization of Up-down Asymmetry of Density Fluctuations induced by a Lower Modular Limiter on Tore Supra*.
- X. Garbet C. Fenzi P. Devynck H. Cappel, G. Antar, *Kelvin-Helmholtz Instability and Edge Turbulence Asymmetry*.

1999, EPS meeting, Maastricht (the Netherlands)

- G. Antar, G. T. Hoang, P. Devynck, X. Garbet, C. Laviron, M. Goniche, *Turbulence Suppression during Reversed Shear Plasma on Tore Supra*.
- G. T. Hoang, G. Antar, T. Aniel, V. Basiuk, A. Becoulet, P. Devynck, J. Lasalle, G. Martin, F. Saint-Laurent, *Reversed Magnetic Shear Operation with ICRF Minority Heating on Tore Supra*.
- P. Devynck, G. Antar, G. Wang, J. P. Gunn, J. Y. Pascal, *Dynamic Study of the Fluctuations Radial Structure Measured by Reciprocating Langmuir Probe on Tore Supra*.
- P. Hennequin, A. Quéméneur, C. Honoré, A. Truc, F. Gervais, G. Antar, C. Fenzi, P. Devynck, R. Sabot, *Plasma Motion and Transport Properties Analyzed by Density Fluctuation Frequency Spectra on Tore Supra*.

2000, APS workshop, Québec (Canada)

- G. Y. Antar, P. Devynck, X. Garbet, S. C. Luckhardt, *Intermittency and Bursts Properties in the Scrape-off layer of Tore-Supra*.
- Liebscher, S. Luckhardt, G. Antar, S. Zweben, *Fast Phosphor Imaging Diagnostic for 2D Plasma Fluctuation Measurement*.
- E. M. Hollmann, G. Antar, R. P. Doerner, S. C. Luckhardt, *Ion Mass Distribution and Temperature Measurements Using an Omegatron Mass Spectrometer*
- G. D. Wang, G. Y. Antar, P. Devynck, *The Hurst Exponent and Long Time Correlation*.

2001, APS Plasma Physics, Long Beach (USA)

- G. Y. Antar, S. I. Krasheninnikov (UCSD), P. Devynck (CEA-Cadarache), R. P. Doerner, E. M. Hollmann, D. Folsom, A. Liebscher, S. C. Luckhardt, R.W. Conn (UCSD), *Existence and Universality of Convective Transport in Magnetically Confined Devices*.

2001, APS Fluid Dynamics, San Diego (USA)

- M.J. Burin G.R. Tynan, G. Y. Antar, N.A. Crocker, J. George, *Dynamics of the Transition to Weak Turbulence in a Magnetized Plasma Column*.
- G. Y. Antar, *Turbulence Small Scale Properties Investigated by Light Scattering*.

2001, APS Plasma Physics, San Diego (USA)

- R. Kaita, R. Majeski, M. Boaz, P. Efthimion, B. Jones, H. Kugel, J. Menard, T. Munsat, A. Post-Zwicker, V. Soukhanovskii, J. Spaleta, G. Taylor, J. Timberlake, R. Woolley, L. Zakharov (Princeton University), M. Finkenthal, D. Stutman (Johns Hopkins University), G. Antar, R. Doerner, S. Luckhardt (UCSD), R. Maingi (ORNL), B. Miller (Dartmouth College), S. Smith (Oklahoma State University), *Experiments with a Toroidal Liquid Lithium Limiter on CDX-U*.
- R. Majeski, R. Kaita, M. Boaz, P. Efthimion, D. Hoffman, B. Jones, H. Kugel, T. Munsat, A. Post-Zwicker, S. Raftopoulos, G.L. Schmidt, V. Soukhanovskii, J. Spaleta, G. Taylor, J. Timberlake (PPPL), M. Finkenthal, D. Stutman (Johns Hopkins Univ.), G. Antar, R. Doerner, S. Luckhardt, R.P. Seraydarian, R.W. Conn (UCSD), R. Maingi (ORNL), R. Causey, D. Buchenauer, M. Ulrickson (SNL), M. Maiorano (Rutgers Univ.), S. Smith (Oklahoma State Univ.), B. Miller (Dartmouth College), *Lithium Plasma-facing components in CDX-U*.
- R.P. Seraydarian (UCSD), G.Y. Antar, R.P. Doerner (UCSD), R. Kaita, R. Majeski (PPPL), S.C. Luckhardt, R.W. Conn (UCSD), CDX-U Team, *A Liquid Lithium Rail Limiter for CDX-U*.
- E. Hollmann, A. Yu. Pigarov, R. Seraydarian, D. G. Whyte, S. I. Krasheninnikov, G. Y. Antar, L. M. Blush, R. P. Doerner, S. C. Luckhardt, R. W. Conn (Center for Energy Research, University of California, San Diego), *Particle balance in detached hydrogen plasmas in the PISCES-A divertor simulator*.
- Liebscher, S. Luckhardt, G. Antar, E. Hollmann, R. Seraydarian (Center for Energy Research, Fusion Energy Division, UC San Diego), S. Zweben (PPPL, Princeton University), *An experimental study of turbulence and coherent modes by cathodoluminescent phosphor plasma imaging*.

2001, 9th European Fusion Theory Conference, Helsingor (Denmark)

- N. P. Basse, S. Zoletnik, M. Saffman, G. Antar, P. K. Michelsen and the W7-AS Team, *Temporal separation of turbulent time series: measurements and simulations*.

2001, TTF workshop, Fairbanks (USA)

- G. Antar, *On the Existence and Universality of Convective Transport in Magnetic Confinement Devices*.

2001, Complex Systems Dynamics Meeting, Fairbanks (USA)

- G. Antar, *On the Hurst Parameters and Correlation Properties*.

2001, EPS Workshop, Madera (Portugal)

- L. M. Blush, R. P. Doerner, G. Antar, E. M. Hollmann, S. C. Luckhardt, D. Whyte, R. W. Conn, *Plasma Detachment in a Simulated Gas Target Divertor*.

2002, APS Plasma Physics, Orlando (USA)

- G. Y. Antar, *On the Existence and Origin of Turbulence Intermittency inside the Last Closed Flux Surface*.

2002, EPS Plasma Physics, Montreux (Switzerland)

- G. Y. Antar, *Existence of Convective Transport in the Scrape-off layer of Magnetically Confined Devices.*
- 2002, TTF, Annapolis (USA)
- G. Y. Antar, A. Liebscher, S. Zweben and S. C. Luckhardt, Imaging Avaloids.
  - M.J. Burin, G. Y. Antar, J. George, N.A. Crocker, G.R. Tynan, *Dynamics of the Transition to Weak Turbulence in a Magnetized Plasma Column.*
- 2003, APS Plasma Physics, Albuquerque (USA)
- G. Y. Antar, *On the Universality of intermittency in the Scrape-off layer of magnetic confinement devices*
- 2003, Ninth Plasma Edge Theory Workshop, San Diego (USA)
- G. Y. Antar, *On the Universality and Origin of Convective Turbulent structures*
- 2003, EPS Plasma Physics, Saint Petersburg (Russia)
- G. Y. Antar, *On the Universality of Avaloids*
- 2003, Turbulence Task Force, Madison (USA)
- G. Y. Antar, *On the Universality of Convective Turbulence.*
- 2004, Turbulence Task Force, Salt lake city (USA)
- G. Y. Antar, *On the origin of intermittency in the scrape-off layer of linear magnetic fusion devices.*
  - G. Y. Antar, *Kolmogorov-Kraichnan Scaling in the Inverse Energy Cascade of Two-dimensional Plasma Turbulence.*
- 2004, US-EU Turbulence Task Force, Varenna (Italy)
- G. Y. Antar, *Kolmogorov-Kraichnan Scaling in the Inverse Energy Cascade of Two-dimensional Plasma Turbulence.*
  - G. Y. Antar, *On the origin of intermittency in the scrape-off layer of linear magnetic fusion devices.*
- 2004, APS, Savannah (USA)
- G. Y. Antar and T. C. Jernigan, *Gas jets and their interaction with magnetically confined plasma.*
- 2005, Turbulence Task Force, Napa (USA)
- G. Y. Antar, G. Counsell, J.W. Ahn, Y. Yang, M. Price and A. Kirk, *The poloidal distribution of turbulent fluctuations in the Mega Ampère Spherical Tokamak.*
  - G. Y. Antar, G. Counsell, J.W. Ahn, and A. Kirk, *The poloidal distribution of type III edge localized modes in MAST.*
- 2005, EPS, Tarragona (Spain)
- G. Y. Antar and T. C. Jernigan, *Progress in the gas jet study and their interaction with magnetically confined plasma.*

- G. Y. Antar, *the poloidal distribution of type III ELMs perturbations in the Scrape-off layer of MAST.*
  - V.S. Udintsev, M. Goniche, J.L. Ségui, G.Y. Antar, G. Giruzzi, P. Maget, D. Molina, A. Krämer-Flecken, W.A. Peebles, A. Sirinelli, Tore Supra Team, *Electron Temperature Fluctuation Studies in Different Confinement Regimes by Means of Correlation ECE on Tore Supra.*
- 2005, IPELS, Tromso (Norway)
- G. Y. Antar, *On the Properties and Origin of Intermittency in the Scrape-off Layer of Magnetic Confinement Devices.*
- 2006, TTF, Myrtle beach (USA)
- G. Y. Antar, S. I. Krasheninnikov, P. Snyder, R. Moyer, R. Pugno and D. Gray, *The Spatio-temporal Evolution of ELMs Investigated on the MAST and the DIII-D tokamaks.*
- 2006, EPS, Rome (Italy)
- G. Y. Antar, S. I. Krasheninnikov, P. B. Snyder, R. A. Moyer, R. Pugno and D. Gray, *The Spatio-temporal Structure of Type I Edge Localized Modes Investigated by Fast Imaging on the DIII-D tokamak.*
- 2006, Electric Field Workshop, Rome (Italy)
- G. Y. Antar, *On the Origin of Intermittency in the Scrape-off Layer of Magnetic Confinement Devices.*
- 2007, EPS Warsaw (Poland)
- G. Y. Antar et al., *Comparison L to H-mode turbulence in the SOL of the ASDEX Upgrade tokamak*
- 2009, First Lebanese Astrophysics Conference, Beirut (Lebanon)
- G. Antar and R. Hajjar, *Convection Processes in Astrophysics, Fusion and Laboratory plasmas*
- 2009, Linksceem Workshop, Beirut (Lebanon)
- G. Antar, F. Hariri and N. Nassif *Simulating bi-Dimensional Turbulence in Fusion Plasmas*
- 2009, IPELS Djurönäset (Sweden)
- G. Antar, *On the Nature of Intermittency in Magnetically Confined Devices*
  - L. Moubarak, L. Zaidouny and G. Antar, *Quasi-2D dynamics in Conducting Fluids to Simulate Turbulence in Magnetic Confinement Devices*
- 2010, Renewable Energy Conference, Beirut (Lebanon)
- G. Antar, *Prospects of Nuclear Fusion Energy Research in Lebanon and the Middle-East*
- 2011, LSMS Annual Meeting, Beirut (Lebanon)

- F. Hariri, G. Antar and N. Nassif, *Simulating Bi-Dimensional Plasma Turbulence using the Hasegawa-Mima Equation*

## Selected Invited Lectures

2001, Invited lecture to DIII-D, La Jolla USA, *On the Existence and Universality of Convective Transport in Magnetically Confined Plasma Devices.*

2002, invited lecture to Tore Supra, CEA-Cadarache France, *UCSD Program on Liquid Walls.*

2002, Invited lecture to MAST, Culham United Kingdom, *On the Existence and Universality of Convective Transport in Magnetically Confined Plasma Device.*

2003, Invited lecture to the Joint European Tokamak, Culham United Kingdom, *Convective Transport in Magnetically Confined Plasma Devices.*

2003, Invited presentation to the International Conference on Plasma Science (ICOPS), Jeju (Korea), *On the Existence, Universality and Origin of Convective Transport in Magnetically Confined Plasma Devices.*

2003, Invited lecture to the University of Balamand, Balamand Lebanon, *Introduction to Magnetic Fusion.*

2003, invited lecture to the Ecole Polytechnique Fédérale de Lausanne, Lausanne Switzerland, *Recent Progress in understanding the properties of turbulence in the scrape-off layer of magnetically confined plasmas.*

2003, invited lecture to the American University of Beirut, Beirut Lebanon, *Introduction to plasma physics and magnetic fusion.*

2005, invited lecture at the Max-Planck Institut für Plasmaphysik, Garching, Germany, *Physics of the scrape-off layer of magnetic confined plasmas.*

2006, invited lecture at the Max-Planck Institut für Plasmaphysik, Greifswald, Germany, *On turbulence in the Scrape-off Layer with Neutral Beam Injection.*

2007, invited lecture at CEA-Cadarache, France, *Turbulence in L and H-mode plasmas.*

2008, invited lecture at the Max-Planck Institut für Plasmaphysik, Garching, Germany, *Turbulence in the SOL with Neutral beams and ion cyclotron resonance heating.*

2010, invited lecture at the Notre-Dame University, *Fusion Energy Research in Lebanon*

2010, invited lecture at the Université de Provence, Marseille

## Teaching Activity

List of the courses taught during the last three years at AUB:

### *Fall 2007-2008*

PHYS 103, 3 credits, 33 students, Freshman level calculus based Classical Mechanics  
PHYS 205, 3 credits, 44 students, Modern Physics for Life Sciences  
PHYS 211L, 1 credit, 60 students, Electricity and Magnetism Lab  
PHYS 205L, 1 credit, 45 students, Modern Physics for Life Sciences Lab

### *Spring 2007-2008*

PHYS 211, 3 credits, 146 students, Electricity and Magnetism  
PHYS 205, 3 credits, 198 students, Modern Physics for Life Sciences  
PHYS 205L, 1 credit, 150 students, Modern Physics for Life Sciences Lab  
PHYS 211L, 1 credit, 60 students, Electricity and Magnetism Lab

### *Summer 2007-2008*

PHYS 211, 3 credits, 33 students, Electricity and Magnetism  
PHYS 205, 3 credits, 33 students, Modern Physics for Life Science  
PHYS 211L, 1 credit, 14 students, Electricity and Magnetism Lab

### *Fall 2008-2009*

PHYS 309K, 3 credits, 7 students, Plasma Physics (Graduate course)  
PHYS 211, 3 credits, 138 students, Electricity and Magnetism  
PHYS 211L, 1 credit, 60 students, Electricity and Magnetism Lab

### *Spring 2008-2009*

PHYS 392G, 1 credit, 1 student, Tutorial graduate course on Plasma Physics  
PHYS 211, 3 credits, 50 students, Electricity and Magnetism  
PHYS 205, 3 credits, 212 students, Modern Physics for Life Sciences  
PHYS 210L, 1 credit, 150 students, Introductory Physics Lab II

### *Summer 2008-2009*

PHYS 211, 3 credits, 23 students, Electricity and Magnetism  
PHYS 205, 3 credits, 25 students, Modern Physics for Life Sciences  
PHYS 211L, 1 credit, 4 students, Electricity and Magnetism Lab

### *Fall 2009-2010*

PHYS 204, 3 credits, 200 students, Classical Physics for Life Sciences  
PHYS 211, 3 credits, 138 students, Electricity and Magnetism  
PHYS 211L, 1 credit, 60 students, Electricity and Magnetism Lab

### *Spring 2009-2010*

On-leave

*Summer 2009-2010*

PHYS 205, 3 credits, 17 students, Modern Physics for Life Sciences

PHYS 205, 3 credits, 15 students, Modern Physics for Life Sciences

PHYS 211L, 1 credit, 4 students, Electricity and Magnetism Lab

*Fall 2010-2011*

PHYS 323, 3 credits, 6 students, Plasma Physics (Graduate course)

PHYS 211, 3 credits, 126 students, Electricity and Magnetism

PHYS 211L, 1 credit, 60 students, Electricity and Magnetism Lab

*Spring 2010-2011*

PHYS 205, 3 credits, 127 students Modern Physics for Life Sciences

PHYS 211, 3 credits, 37 students, Electricity and Magnetism

PHYS 211L, 1 credit, 58 students, Electricity and Magnetism Lab

**Advising of AUB students**

Since 2008 Freshman student advisor, with about 60 students per year.

**Research Adviser**

Before joining AUB

- Liebscher, PhD student at UCSD, on imaging turbulence in PISCES linear plasma device using phosphor screen and a fast camera.
- M. Burin, PhD student at UCSD, on the transition to turbulence of in the CSDX linear plasma device.
- L. Li, PhD student at UCSD, on the effect of electric shear on turbulence using electrodes installed at the end-plate.
- L. Estrada-Milla, PhD student at UCSD, on the effect of detachment on turbulence in PISCES linear plasma device.
- D. Falsom, PhD student at UCSD, on the correlation of bursts in the poloidal plane using multiple probes on PISCES.
- N. Crocker at UCSD, Post-graduate researcher, on the measurement of the energy transfer in plasma and the effects of radial electric shear on the CSDX linear plasma device.

- C. Fenzi, PhD student at CEA-Cadarache, on the poloidal asymmetry of turbulence in the Tore Supra tokamak.

#### After joining AUB

- Rima Hajjar, MS student at AUB Physics Department, June 2010, *Simulating gas puffing into fusion tokamaks for disruption mitigation purposes.*
- Farah Hariri, MS student at AUB Computational Science Department (co-advised by Dr. N. Nassif), June 2010, *Turbulence simulation of linear plasma devices with an axial magnetic field.*
- Lamiss Zaidouny, MS student at AUB Physics Department, August 2010, *The motion of liquid metals subject to electromagnetic forces in a cylindrical container.*
- Loutfallah Moubarak, MS student at AUB Physics Department, October 2010, *Fluid motion in a rectangular container subject to electromagnetic forces and the effects of the boundaries.*
- Wassim Kassim, BS student at AUB Physics Department (co-adviser, advisor M. Tabbal), *Tungsten deposition on graphite tiles using PLD for fusion application.*

#### **Membership in MS thesis committees**

- Mher Kazandjian, MS Physics 2008,  *$m=1$  mode instabilities in counter-rotating annuli in near Keplerian potentials.*
- Noura M. M. Abdallah, MS Physics 2009, *Probe measurements in low-pressure expanding microwave excited plasmas.*
- Maya N. Abi Akl, MS Physics 2009, *Phase control of manganese dioxide thin films by plasma assisted laser ablation.*
- Lina Abdul Rahman, MS Physics 2010, *Unzipping a random copolymer from an adsorbing surface*
- Georges Al-Makdessi, MS Physics 2010, *Plasma characterization for coating purposes*

#### **Supervisor of research projects**

- R. Yassine, Illinois College (USA) 2010 summer internship on *quantifying the motion of liquid metals by surface reflection.*

- H. Assi, Washington & Lie University (USA), 2009 summer internship on *understanding of ultrasound wave propagation and detection of motion in liquid gallium.*
- O. Malaeb, 2008, *two-dimensional turbulence in plasmas and the Hasegawa-Mima equations.*
- S. Bechara, 2008, *two-dimensional turbulence in incompressible fluids and the relationship between fluid and plasma turbulence.*
- M. Labbane, *the feasibility of complex fluid flows subject to electromagnetic forces.*
- Mohamad Ali Bitar, *Antenna design for RF plasma generation*
- Rima Hajjar, *Parallel transport in plasmas and numerical simulation of plasma-massive gas jet interaction*
- Loutfallah Moubarak, *Investigating the generation of two-dimensional turbulence in electrolytes using electromagnetic forces.*
- Mervat Madi, PhD student in the Electrical Engineering Department, co-advisor, *RF interaction with plasmas and neutrals*

## Services to the University

- Member of Mission Statement committee (2007-08)
- Member of the Core Lab Committee (2007-09)
- Member of the Strategic Planning Committee (2007-08)
- Judge of school students projects in the Science, Math and Technology Fair organized by the Department of Education at AUB (2007-08)
- Advisor to the Physics Student Society (2008-2009)
- Observer in the AUB student's committee election (2007-2010)

