

# CURRICULUM VITAE

## PERSONAL INFORMATION

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| Name and surname | Sotiris Danakas  |
| Current address  | Department of Physics,<br>University of Ioannina<br>Laboratory of Atomic and Molecular Physics<br>GR 45110, Ioannina, Greece |
| Position         | Laboratory Teaching Staff (E.DI.P)   |
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## RESEARCH INTERESTS IN COMPUTATIONAL PHYSICS

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- Numerical solution of the 2D Schrodinger equation in hydrogenic and multielectron atoms under the influence of an external electric field (Stark effect).
- Algorithmic reconstruction of the 3D velocity distribution from 2D VMI (Velocity Map Imaging) images.
- Simulations in atomic and molecular physics:
  - Electron/ion tracing in ToF mass spectrometers.
  - Electron rescattering in simply charged ions.
  - Laser beam ray tracing in optically anisotropic media (uniaxial and biaxial birefringent crystals).
  - Molecular dynamics under femtosecond asymmetric laser  $\omega/2\omega$  irradiation.
- Simulations in Solid State Physics:
  - X-ray tracing in wavelength dispersive spectrometers.
- Algorithms for synchronous and asynchronous collection/processing/curation of experimental data.
- Custom algorithms for data fitting in various experimental areas.
- Image processing (2D/3D).

## COMPUTATIONAL SKILLS

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- Excellent knowledge of the *Mathematica* software package

## RESEARCH PUBLICATIONS

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1. "Analogies between two optical systems (photon beam splitters and laser beams) and two quantum systems (the two-dimensional oscillator and the two-dimensional hydrogen atom)",  
S. Danakas and P.K. Aravind,  
*Phys. Rev. A.* 45: 1973-1978 (1992).
2. "Difference Compton profiles of Zr and ZrH<sub>2</sub>"  
N.G. Alexandropoulos, S.K. Danakas, K.T. Kotsis and N.I. Papanicolaou,  
*Solid State Commun.* 92: 453-457 (1994).
3. "Experimental and theoretical Compton profiles of calcium at room and high temperatures"

- S.K. Danakas, K.T. Kotsis and N.I. Papanicolaou,  
*Phys. Stat. Sol B* 209: 81-92 (1998).
4. "Search for evidence of double K-shell ionization in Mg by single X-ray photon inelastically scattered in the near threshold regime"  
N.G. Alexandropoulos and S.K. Danakas,  
*Nucl. Instrum. Meth. B* 149: 25-30 (1999).
  5. "Formation of Molecular Halide Ions from Alkyl-Halide Clusters Irradiated by ps and fs Laser Pulses".  
G. Karras, S. Danakas and C. Kosmidis,  
*J. Phys. Chem. A*, 115 (17), 4186–4194 (2011).
  6. "Selective ionization/dissociation of oriented N<sub>2</sub>O molecules by asymmetric fs laser field",  
N. Kotsina, S. Kaziannis, S. Danakas and C. Kosmidis,  
*J. Chem. Phys.*, **139** (10), # 104313 (2013).
  7. "Experimental implementation of a strong two-color asymmetric laser field in the mid-infrared",  
S. Kaziannis, S. Danakas, N. Kotsina and C. Kosmidis,  
*Laser Phys. Lett.*, **13** (5), # 055301 (2016).
  8. "Photodetachment and photoionization rainbows and glories",  
S. Cohen, P. Kalaitzis, S. Danakas, F. Lepine and C. Bordas,  
*J Phys. B: At. Mol. Opt. Phys*, **50**, # 065002 (2017).
  9. "Influence of long-range Coulomb interaction in velocity map imaging",  
T. Barillot, R. Bredy, G. Celep, S. Cohen, I. Compagnon, B. Concina, E. Constant, S. Danakas, P. Kalaitzis, G. Karras, F. Lepine, V. Loriot, A. Marciniak, G. Predelus-Renois, B. Schindler and C. Bordas, *J Chem. Phys.*, **147**, # 013929 (2017).
  10. "LSPR based optical fiber sensors treated with nanosecond laser irradiation for refractive index sensing",  
D. Spasopoulos, S. Kaziannis, S. Danakas, A. Ikiades, C. Kosmidis, *Sensors and Actuators B: Chemical*, **256**, 359 – 366 (2018).
  11. "Photoionization microscopy: Hydrogenic theory in semiparabolic coordinates and comparison with experimental results",  
P. Kalaitzis, S. Danakas, F. Lepine, C. Bordas and S. Cohen,  
*Phys Rev. A* **97**, # 053412 (2018).
  12. "Near-saddle-point-energy photoionization microscopy images of Stark states of the magnesium atom",  
P. Kalaitzis, S. Danakas, C. Bordas and S. Cohen,  
*Phys Rev. A* **99**, # 023428 (2019).
  13. "Glory oscillations in photoionization microscopy: Connection with electron dynamics and Stark spectral structures in the continuum",  
P. Kalaitzis, S. Danakas, K. Ferentinou, C. Bordas and S. Cohen,  
*Phys Rev. A* **102**, # 033101 (2020).
  14. "Transition from correlated to single-active-electron excitation in strontium nonlinear ionization",  
A. Dimitriou, V. Loriot, A. Marciniak, T. Barillot, S. Danakas, F. Lepine, C. Bordas, and S. Cohen,  
*Phys Rev. A* **105**, # 053106 (2022).

15. "Manipulating slow photoelectron wave packets by rotation of the linear laser polarization",  
P. Kalaitzis, S. Danakas, C. Bordas and S. Cohen,  
*Phys Rev. A* **108**, # 013106 (2023).
16. "Glory interference spectroscopy in Sr atom",  
K. Ferentinou, S. Danakas, C. Bordas and S. Cohen,  
*J. Phys. B: At. Mol. Opt. Phys.* **57** (2024) 115002
17. "Photoionization microscopy in the time domain: Classical atomic chronoscopy",  
P. Kalaitzis, S. Danakas, K. Ferentinou, S. Cohen and C. Bordas,  
*Phys Rev. A* **110**, # 013112 (2024)
18. "Fisher Information-Based Optimization of Mapped Fourier Grid Methods",  
S. Danakas and S. Cohen,  
*Atoms* **12**, 50., (2024)

#### **SIMULATION SOFTWARE (OPEN ACCESS)**

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1. "Birefringence at an Isotropic-Uniaxial Interface: Waves, Rays, and Fresnel Coefficients",  
S. Danakas,  
Wolfram Demonstrations Project, 2012,  
<http://demonstrations.wolfram.com/BirefringenceAtAnIsotropicUniaxialInterfaceWavesRaysAndFresn/>.
2. "Uniaxial-Biaxial Birefringence: Geometrical Constructions for Optical EM Waves",  
S. Danakas,  
Wolfram Demonstrations Project, 2014,  
<http://demonstrations.wolfram.com/UniaxialBiaxialBirefringenceGeometricalConstructionsForOptic/>.