
On Photovoltaics

- D. Aureau, M. Bouttemy, M. Frégnaux, A. Etcheberry, Y. Shoji, Z. Jehl, D. Suchet, J.F. Guillemoles and Y. Okada, "Chemical engineering of quantum dots: A multi-scale physico-chemical study", in preparation.
This collaborative work with Institut Lavoisier Versailles aims at post-processing InAs quantum dots in a GaAs matrix to tailor their shape and properties, especially for Energy Selective Contact applications in Hot Carrier Solar Cell.
- S. Almosni, A. Delamarre, Z. Jehl, D. Suchet et al., "Material Challenges for Solar Cells in the XXIst century", accepted *Science and Technology of Advanced Materials* (DOI 10.1080/14686996.2018.1433439), 2018
This review on PV technologies focuses on materials, from historical background to perspectives for new concepts. I wrote the overview on mature technology sectors, and contributed to the hot carriers part.
- D. Suchet, A. Jeantet, T. Elghozi and Z. Jehl, "Towards an intrinsic definition of intermittency, the case study of electricity in France", submitted to *Energy Policy*, 2018.
This proposal offers a statistical approach of intermittency of energy production, aiming at defusing the semantic charge this term acquired in the public debate, especially in the PV sector.
- N Cavassilas, D. Suchet, A. Delamarre, F. Michelini, M. Bescond, Y. Okada, M. Sugiyama and JF Guillemoles, "Beneficial impact of tunneling on electronic collection in intermediate-band solar cell", submitted to *IEEE Journal of Photovoltaics*, 2018.
- A. Delamarre, D. Suchet, N Cavassilas, Y. Okada, M. Sugiyama and JF Guillemoles, "An electronic ratchet is required in nanostructured intermediate band solar cells", submitted to *IEEE Journal of Photovoltaics*, 2018.
- D. Suchet, A. Delamarre, N Cavassilas, Z. Jehl, Y. Okada, M. Sugiyama and JF Guillemoles, "Voltage preservation in ratchet band solar cells", in preparation, to be submitted to *Progress in Photovoltaic*, 2018.
These three articles bring a new perspective on Intermediate Band Solar Cells, and emphasize the key role of an energy shift in the conduction band (electronic ratchet) to reduce recombination. The third paper proves analytically voltage preservation in such systems using Lagrange multipliers - a powerful tool that could be extended to a variety of situations in PV.
- D. Suchet, Z. Jehl, J.F. Guillemoles and Y. Okada, "Influence of Hot-Carrier Extraction from a Photovoltaic Absorber: An Evaporative Approach", *Physical Review Applied*, **vol 8**, 034030, 2017.
This work suggests an optical method inspired by cold atom experiment to evidence the selective extraction of hot-carriers by monitoring the temperature of the remaining population.

On Cold Atoms

- D. Suchet, Z. Wu, F. Chevy and G. Bruun, "Long ranged mediated interaction in mixed dimensions", *Physical Review A*, **vol 95**, no. 4, p. 043643, 2017
- Z. Wu, D. Suchet, F. Chevy and G. Bruun, "?insert title?", *in preparation*
These two publications study how an effective long-range interaction between two 2D layers can emerge from contact interactions with a 3D gas. A non-perturbative analysis is performed through the BEC-BCS crossover, and results in an experimental proposal to test the predictions.
- D. Suchet, M. Rabinovic, T. Reimann, N. Kretschmar, F Sievers, C. Salomon, J. Lau, O. Goulko, C. Lobo and F. Chevy, "Analog simulation of Weyl particles with cold atoms", *EuroPhysics Letters*, **vol 114**, no.2, 2016.
- J. Lau, D. Suchet, O. Goulko, T. Reimann, C. Enesa, M. Rabinovic, C. Salomon, F. Chevy and C. Lobo, "Quasi-Thermalisation of Fermions in a Quadrupole Trap", *in preparation*.
These works investigate experimentally, numerically and theoretically how an ensemble of particles can relax towards a steady-state, where some quantities equilibrate, despite the absence of interactions. The influence of the trap geometry and dimensionality highlight the trade-off between several dephasing processes.

- F. Sievers, N. Kretzschmar, D. R. Fernandes, D. Suchet, M. Rabinovic, S. Wu, C. V. Parker, L. Khaykovich, C. Salomon and F. Chevy. "Simultaneous sub-Doppler laser cooling of fermionic ${}^6\text{Li}$ and ${}^{40}\text{K}$ on the D_1 line: Theory and experiment", *Physical Review A*, **vol** 91, no. 2, 2015

This paper reports the highest phase-space density for the simultaneous optical cooling for two fermionic species, obtained thanks to an innovative cooling scheme developed by our group and analyzed here.

Other

- J. Souchay, A. H. Andrei, C. Barache, S. Bouquillon, D. Suchet, F. Taris and R. Peralta, "The second release of the large quasar astrometric catalogue (LQAC)", *Astronomy and Astrophysics*, **vol** 537, 2011
- J. Souchay, A. H. Andrei, C. Barache, S. Bouquillon, A.-M. Gontier, S. B. Lambert, C. Le Poncin-Lafitte, F. Taris, E. F. Arias, D. Suchet and M. Baudin, "The construction of the large quasar astrometric catalogue (LQAC)", *Astronomy and Astrophysics*, **vol** 494, no. 2, 2009

These publications introduce the LQAC, the largest Quasar Catalogue to date. I wrote the scripts for data compilation, and elaborated the definition of "quasar" used in this work.

Proceedings

Photovoltaics

- Z. Jehl, D. Suchet, A. Julian, C. Bernard, N. Miyashita, F. Gibelli, Y. Okada and J.-F. Guillemoles, "Modeling and characterization of double resonant tunneling diodes for application as energy selective contacts in hot carrier solar cells", *Proceedings of SPIE*, **vol** 10099, p.100990N, 2017.

This proceedings reports a new model to account for energy selective contacts, differentiating three contributions to the Negative Differential Resistance signal (tunnel, feed and amplitude resonances).

- A. Delamarre, D. Suchet, N. Cavassilas, Y. Okada, M. Sugiyama and J.-F. Guillemoles, "Non-ideal nanostructured intermediate band solar cells with an electronic ratchet", *submitted to Proceedings of SPIE*, 2018.

This proceedings present our first results on Ratchet Band Solar Cells, suggest guidelines to realize such systems and draw a map of constraints set on standard Intermediate Band Solar Cell.

- Z. Jehl, D. Suchet, N. Miyashita, B. Behagel, M. Giteau, A. Delamarre, J.-F. Guillemoles and Y. Okada, "Hot Carrier Extraction Using Energy Selective Contacts and Feedback On The Remaining Distribution", *submitted to WCPEC-7*, 2018.
- M. Giteau, S. Collin, Z. Jehl, D. Suchet, J.-F. Guillemoles and Y. Okada, "Advanced Light Trapping for Hot-Carrier Solar Cells", *submitted to WCPEC-7*, 2018.
- B. Galvani, A. Delamarre, D. Suchet, M. Bescond, F. Michélini, M. Lanoo, M. Sugiyama, J. Even, J.-F. Guillemoles and N. Cavassilas, "Modeling and characterization of double resonant tunneling diodes for application as energy selective contacts in hot carrier solar cells", *submitted to WCPEC-7*, 2018.
- A. Delamarre, D. Suchet, N. Cavassilas, Z. Jehl, Y. Okada, M. Sugiyama and J.-F. Guillemoles, "Resilient Intermediate Band Solar Cell using an electronic ratchet", *submitted to WCPEC-7*, 2018.

These 4 contributions summarize and extend results obtained during my stay in Japan. They are currently submitted as 3 pages abstract for the main PV conference.

On Cold Atoms

- D. Suchet, "La Quête des Températures Ultrabasses", in *Le Froid. Adaptation, production, représentations, effets.*, edited by D. Chartier and J. Borm (Les Presses de l'Université du Québec), 2018 (to be published). Available at [hal-01675654](https://hal.archives-ouvertes.fr/hal-01675654).

This talk was first performed during a workshop dedicated to Cold, then presented in several occasions as large audience lecture.

- D. Suchet, "Launch of Emergent Scientist: hands on peer-review publication for science students", *Emergent Scientist*, **vol 1**, 2017.
This editorial introduces the aim and scope of Emergent Scientist, as a pedagogical tool for scientific publication.
- D. Suchet, "Traduire la Physique", *Ecritures*, **vol 9**, 2017. Available at [hal-01675746](https://hal.archives-ouvertes.fr/hal-01675746).
This work considers how translation theory can enlighten physics. It also presents my personal approach to popular science.
- D. Suchet et D. Elghozi, "Cent ans de Physique et de Magie, une illustration du Tractatus des Gentils Commentateurs Multidisciplinaires (TGCM)", *Alliage*, **vol 76**, 2016. Available at [hal-01676239](https://hal.archives-ouvertes.fr/hal-01676239).
The TGCM is a manifesto, signed by researchers in literature and science, as well as by literary publishers and scientific mediators. It advocates the relevance of scientific analysis, complementary to literary ones, to play with work of fictions.
- D. Suchet, "Jeux combinatoires", *Histoire courte par Anne Papillault et Jean-François Dars*, 2014. Available at <http://histoires-courtes.fr/#page=Suchet>.
"Histoires courtes" is a series of short video portraits of reseachers. In this one, I talk about my interest for Physics, and the versatility of its approach.
- D. Suchet, A. Jeantet, T. Elghozi and Z. Jehl, "Vers une définition de l'intermittence : étude de cas des sources d'énergie électrique en France", submitted to *Reflets de la Physique*, 2018.
A French popular version of the text submitted to *Energy Policy*, adapted for a special issue on Energy of the French Physical Society's journal.