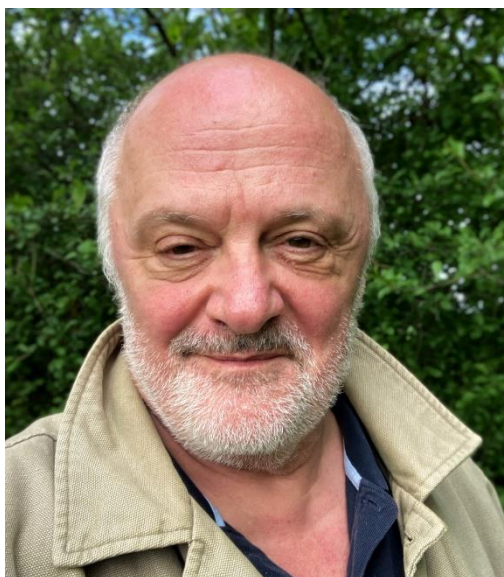


## Seminario per Dottorato – Luca Turin 14/06/2022



### **Abstract:**

We have proposed that olfactory receptors are electronic devices detecting molecular vibrations by inelastic electron tunnelling. Since olfactory receptors are G-protein coupled receptors (GPCRs), this raises the question of whether a similar mechanism exists in other GPCRs. Using known GPCR structures and electronic structure modelling with DFT, we have found evidence of a functional electronic circuit in GPCRs ranging from their ancestor rhodopsin to neurotransmitter receptors. The technical and conceptual problems involved in this approach will be outlined, and open questions will be reviewed.

### **Bio**

Luca Turin was born in 1953 in Beirut, Lebanon, to Italian-Argentinian parents. Brought up in France, Italy and Switzerland. Studied Physiology and Biophysics at University College London, PhD in 1978. Worked at the CNRS 1982-92, then lecturer in Biophysics at UCL 1992-2000. He is best known for his work on olfaction, in which he proposed a quantum mechanism for odorant recognition by receptors. For 8 years he was CTO of a venture company designing odorants for fragrance and flavors with a success rate 100 times the industry average. After returning to full time research in 2009, in collaboration with Makis Skoulakis in Athens, Greece, he has shown that both flies and humans can detect molecular vibrations by smell. His current interest is in quantum electronics in neuroscience. He is the author of three perfume guides, a collection of essays and a popular science book on how smell works. He was the Stavros Niarchos Researcher at the Alexander Fleming Institute in Athens. He moved to the UK in 2020 and is currently Professor in the Medical School at the University of Buckingham (UK)

## Publications

Anomalous viscosity of a racemate: a simple experiment demonstrating chirally induced spin selectivity E Daplan, U Terranova, L Turin  
The Journal of Physical Chemistry Letters 13, 4215-4219 2022

Method of detecting passively induced rf emissions from spin polarized electrons L Turin  
US Patent App. 17/540,957 2022

Spontaneous radiofrequency emission from electron spins within *Drosophila*: a novel biological signal A Gaitanidis, A Sotgiu, L Turin  
Current Research in Neuroadaptive Technology, 235-253 2022

Medical device for detecting passively induced RF emissions from spin polarized electrons L Turin  
US Patent 11,191,852 2021

Evidence for Free Radical Drug Ligands in class A G-protein Coupled Receptors AS Gehrckens, AP Horsfield, EMC Skoulakis, L Turin  
2021

Evidence for Free Radical Drug Ligands in class A G-protein Coupled Receptors L Turin, EMC Skoulakis, AP Horsfield, A Gehrckens  
bioRxiv 2021

*Drosophila tau* negatively regulates translation and olfactory long-term memory, but facilitates footshock habituation and cytoskeletal homeostasis K Papanikolopoulou, IG Roussou, JY Gouzi, M Samiotaki, G Panayotou, ...  
Journal of Neuroscience 39 (42), 8315-8329 15 2019

SPONTANEOUS RADIOFREQUENCY EMISSION FROM NONEQUILIBRIUM ELECTRON SPINS WITHIN *DROSOPHILA* A Gaitanidis, L Turin  
The Second Neuroadaptive Technology Conference, 67 2019

Spontaneous Radiofrequency Emission from Electron Spins within *Drosophila*: a preliminary report on a novel biological signal A Gaitanidis, A Sotgiu, L Turin  
arXiv preprint arXiv:1907.04764 2019

Gated electron transport in rhodopsin and its relevance to GPCR activation AS Gehrckens, AP Horsfield, EMC Skoulakis, L Turin  
bioRxiv, 650531 2019  
W

Passively induced rf emissions from spin polarized electrons in living matter L Turin  
US Patent App. 15/683,960 2 2018

Electron spin resonance (epr) in *drosophila* and general anesthesia L Turin, EMC Skoulakis  
Methods in enzymology 603, 115-128 8 2018

Vibrational detection of odorant functional groups by *drosophila melanogaster* K Maniati, KJ Haralambous, L Turin, EMC Skoulakis  
Eneuro 4 (5) 8 2017

Molecular recognition in olfaction AP Horsfield, A Haase, L Turin  
Advances in Physics: X 2 (3), 937-977 17 2017

Minute impurities contribute significantly to olfactory receptor ligand studies: tales from testing the vibration theory M Paoli, D Münch, A Haase, E Skoulakis, L Turin, CG Galizia  
Eneuro 4 (3) 14 2017

Differential electrophysiological responses to odorant isotopologues in drosophilid antennae E Drimyli, A Gaitanidis, K Maniati, L Turin, EMC Skoulakis  
Eneuro 3 (3) 12 2016

Plausibility of the vibrational theory of olfaction L Turin, S Gane, D Georganakis, K Maniati, EMC Skoulakis  
Proceedings of the National Academy of Sciences 112 (25), E3154-E3154 35 2015

Electron spin changes during general anesthesia in Drosophila L Turin, EMC Skoulakis, AP Horsfield  
Proceedings of the National Academy of Sciences 111 (34), E3524-E3533 61 2014

Research fraud: how to do it and how to stop it L Turin  
BMJ 349 1 2014

Odor generalization according to vibrational spectra K Maniati, E Skoulakis, L Turin  
Flavour 3 (1), 1-1 2014

Vibrational olfaction in flies and humans L Turin  
Flavour 3 (1), 1-1 2014

SHOULD RESEARCH FRAUD BE A CRIME? Research fraud: how to do it and how to stop it L Turin  
BMJ 349 2014

Molecular vibration-sensing component in human olfaction S Gane, D Georganakis, K Maniati, M Vamvakias, N Ragoussis, ...  
PloS one 8 (1), e55780 118 2013

Recent developments in the physics of your sense of smell A Horsfield, L Turin, YA Soh, M Sourribes, M Stoneham, L Tong, ...  
Proceedings of the National Academy of Sciences 108 (31), E350-E350 10 2011  
APS March Meeting Abstracts 2011, P38. 006 2011

A Quantum of Solace: molecular electronics of benzodiazepines L Turin, A Horsfield, M Stoneham  
APS March Meeting Abstracts 2011, P38. 007 1 2011

Molecular vibration-sensing component in Drosophila melanogaster olfaction MI Franco, L Turin, A Mershin, EMC Skoulakis  
Proceedings of the National Academy of Sciences 108 (9), 3797-3802