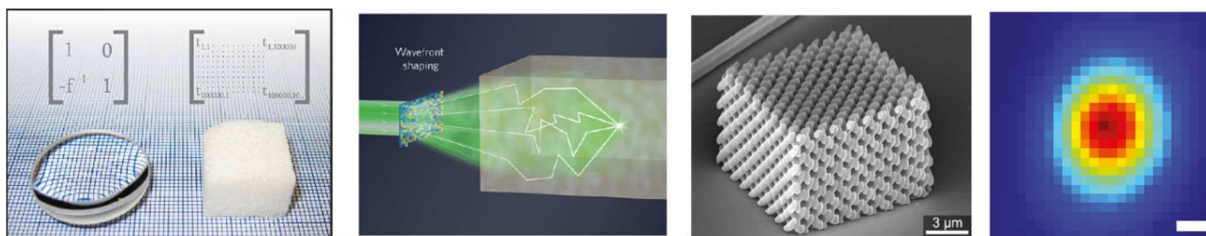




Summer school in IESC, Cargèse, Corsica, France, April 24th-28th, 2017

Spatio-Temporal Control of Waves: From Imaging to Sensing



School director: Mathias Fink

Scientific committee: M. Fink, H. Cao, A.P. Mosk, J.H. Page

Organizing committee: A. Aubry, G. Lerosey, R. Pierrat



Institut Langevin
ONDES ET IMAGES



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Spatio-Temporal Control of Waves: From Imaging to Sensing

Workshop Scope

Amongst numerous communities and fields of research related to wave physics, scientists share the same goal of exploring and understanding what surrounds them, from the very small scale of the atom to the infinite one of the universe. Throughout these disciplines, although different types of waves, spatial scales or propagation media require specific instruments and methods, some key concepts are clearly of common interests. For instance, the physics of wave propagation in complex, scattering and structured media is at the heart of various research fields such as metamaterials and crystals, Anderson localization in fundamental physics, or bio-imaging in applied physics. Similarly, arrays of sensors are being more and more used in domains ranging from ultrasound imaging or optics, to those of seismology or radio-astronomy. Furthermore, all these research fields are clearly working towards very similar goals related to the control of wave propagation, through the concept of time reversal or wave-front shaping, or to their signal processing counterparts, namely, the notions of cross-correlation imaging or compressive sensing.

The aim of this summer school is to create bridges between these various areas of research by gathering their most inspiring scientists in the beautiful village of Cargèse in Corsica. This will permit them to share and confront the concepts developed in their own fields of research with others, which will hopefully lead to many fruitful discussions and collaborations. A specific effort will be made to target the younger audience. It will allow PhD students and young scientist to acquire a solid and broad knowledge of wave physics from the best experts worldwide.

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Spatio-Temporal Control of Waves: From Imaging to Sensing

Program

Time\Day	Monday	Tuesday	Wednesday	Thursday	Friday
9h-10h30	Mathias Fink	David Smith	Stefan Rotter	Steven Cummer	Hui Cao
10h30-11h	<i>Coffee Break</i>	<i>Coffee Break</i>	<i>Coffee Break</i>	<i>Coffee Break</i>	<i>Coffee Break</i>
11h-12h30	Allard Mosk	Yonina Eldar	John Page	Juan-José Sáenz	Thomas Wellens
12h30 -13h30	<i>Lunch</i>	<i>Lunch</i>	<i>Lunch</i>	<i>Lunch</i>	<i>Lunch</i>
13h30 -15h	<i>Discussions & Beach</i>	<i>Discussions & Beach</i>	Poster Session (13h30-17h)	<i>Discussions & Beach</i>	Shakeeb Bin Hasan
15h00-16h30	John Pendry	Sergey Skipetrov		Emmanuel Fort	<i>The end</i>
16h30-17h	<i>Coffee Break</i>	<i>Coffee Break</i>		<i>Coffee Break</i>	
17h-18h30	Valentin Freilikher	Douglas Stone	Georg Maret		
After	<i>Welcome Drink (18h30)</i>	<i>Free</i>	<i>Free</i>	<i>Dinner (19h30)</i>	

Speakers and courses

Spatio-temporal control of light propagation in multimode fibers

Pr. Hui Cao – Yale University

Acoustic metamaterials

Pr. Steven Cummer – Duke University

Compressed sensing

Pr. Yonina Eldar – Technion University

Matrix approach of wave imaging through complex media

Pr. Mathias Fink – ESPCI Paris

Basic physics of Anderson localization

Pr. Valentin Freilikher – Bar-Ilan University

Dynamic light scattering

Pr. Georg Maret – University of Konstanz

Spatio-temporal control of water waves

Pr. Emmanuel Fort – ESPCI Paris

Wave-front shaping

Pr. Allard Mosk – Utrecht University

Acoustic waves in complex media

Pr. John Page – University of Manitoba

Transformation optics

Pr. John Pendry – Imperial College

Mesoscopic scattering meets wave control

Pr. Stefan Rotter – Vienna University of Technology

Near-field optics and multiple scattering

Pr. Juan José Sáenz – DIPC, San Sebastian

Anderson localization

Dr. Sergey Skipetrov – CNRS – LPMMC, Grenoble

Electromagnetic metamaterials

Pr. David Smith – Duke University

Statistical theory of diffusive wave transport and wavefront shaping

Pr. Douglas Stone – Yale University

Photonic band gap crystals

Dr. Shakeeb Bin Hasan – University of Twente

Mesoscopic physics with cold atoms

Dr. Thomas Wellens – University of Freiburg

Posters

- 1. Measuring the transmission matrix of strongly scattering media**
P. Pai, J. Bosch and A. Mosk
- 2. Wavefront shaping for glare reduction**
A. Daniel, L. Liberman and Y. Silberberg
- 3. Negative refraction experiments in acoustic metafluids**
T. Brunet, A. Kovalenko, B. Tallon, O. Mondain-Monval and O. Poncelet
- 4. Near-field effects in Anderson localization**
N. de Sousa, L. S. Froufe-Pérez, F. Scheffold, J. Luis-Hita, M. Marqués and J. J. Sáenz
- 5. Quantum survival of correlated two-photon states through bound states in the continuum**
H. Chen, G. Wang and Y. Lai
- 6. Selective Mode Excitation for Robust Focusing through Multi Mode Fibers**
S. Singh and R. Piestun
- 7. Three-dimensional Crystal of Cavities in a 3D Photonic Band Gap Crystal**
S. A. Hack, J. J.W. van der Vegt and W. L. Vos
- 8. Statistics of transmission and phase distribution in chaotic reverberation chambers**
M. Richter, J.-B. Gros, U. Kuhl, F. Mortessagne, O. Legrand and E. Richalot
- 9. Controlling transmission eigenchannels in random media by edge reflection: effects of asymmetry**
V. Freilikher
- 10. Photoacoustic wave-front shaping: from linear to nonlinear**
E. Premillieu, O. Tzang and R. Piestun
- 11. Continuous axial scanning of a gaussian beam via beam steering**
P. Boucher, N. Barré, O. Pinel, G. Labroille and N. Treps
- 12. Controllable two-photon quantum interference in multimode fibers**
S. Leedumrongwatthanakun, H. Defienne, T. Juffmann and S. Gigan
- 13. Spatio-temporal control of an ultrashort pulse through multiple scattering media**
M. Mounaix, H. Defienne, D. Andreoli, G. Volpe, O. Katz, S. Grésillon and S. Gigan

14. **Wave emission by a moving source**
G. d'Hardemare, S. Wildeman, L. Domino, M. Fink, A. Eddi and E. Fort
15. **Multiple scattering in resonant emulsions: Coherent propagation and diffusive transport**
B. Tallon, T. Brunet and J. H. Page
16. **Long-range spatial-temporal correlations in spatial-temporal control**
C. W. Hsu, D. Stone and H. Cao
17. **Photonic bound states in the continuum**
C. W. Hsu, B. Zhen, J. Lee, L. Lu, S. Johnson, J. Joannopoulos, D. Stone and M. Soljačić
18. **In vivo human cornea visualized with FF-OCT**
V. Mazlin, E. Dalimier, K. Grieve, K. Irsch, J. Sahel, M. Fink and C. Boccara
19. **Toward in vivo retinal imaging with full-field OCT**
P. Xiao, M. Fink and A. C. Boccara
20. **Comparison of super-localization methods for photoacoustic imaging**
S. Vilov, B. Arnal and E. Bossy
21. **Focusing through dynamic biological tissues using fast wavefront optimization**
B. Blochet, L. Bourdieu and S. Gigan
22. **Imaging and sensing with multiple scattering media**
R. French, S. Gigan and O. L. Muskens
23. **Casimir stress inside planar materials**
I. Griniasty and U. Leonhardt
24. **Artificial crystals for hydroelastic waves**
L. Domino, M. Fermigier, E. Fort and A. Eddi
25. **Diffusion and Anderson localization of classical waves in 3D anisotropic media**
A. Goicoechea and J. Page
26. **Correlations in propagation of weakly scattered light through anisotropically scattering media**
M. Kadobianskyi, I. Papadopoulos, R. Horstmeyer and B. Judkewitz
27. **An acoustic Metamaterial with a Graphene-like Dispersion**
S. Yves, F. Lemoult, M. Fink and G. Lerosey
28. **Transmission eigenchannels of disordered media in open geometry**
H. Yilmaz, C. Wei Hsu, A. Yamilov and H. Cao
29. **Statistical links between reflected and transmitted speckle patterns**
N. Fayard, I. Starshinov, A. Paniagua-Diaz, J. Bertolotti, A. Cazé, A. Goetschy, R. Pierrat and R. Carminati

30. **Nonlinear and Chiral Coherent Perfect Absorption**
W. R. Sweeney, A. Cerjan, C. W. Hsu, S. Rotter and A. D. Stone
31. **Near-Infrared to Visible Upconversion Imaging for Long Range Target Detection**
R. Demur, A. Grisard, E. Lallier, L. Morvan, L. Leviandier, N. Treppe and C. Fabre
32. **Nanoantenna for enhanced STM-based generation of surface plasmons**
F. Bigourdan, J-P. Hugonin, F. Marquier, C. Sauvan and J-J. Greffet
33. **Optical Helmholtz resonator nanoantenna for the detection of few resonant molecules**
F. Bigourdan, J-P. Hugonin, F. Marquier and J-J. Greffet
34. **Quantitative Analysis of THz Imaging Systems In Brownout Conditions**
C. Prophète, E. Kling, H. Sik, R. Carminati and J. de Rosny
35. **Spatio-temporal Wave Front Shaping in a Microwave Cavity**
P. del Hougne, F. Lemoult, M. Fink, G. Lerosey
36. **Matrix approach of seismic wave imaging: Application to Erebus volcano**
T. Blondel, J. Chaput, A. Derode, M. Campillo, A. Aubry
37. **Matrix approach of optical eye imaging**
V. Barolle, A. Badon, A. C. Boccara, M. Fink, A. Aubry
38. **Controlling the propagation of elastic waves with negative refraction**
F. Legrand, B. Gérardin, J. Laurent, C. Prada, A. Aubry
39. **Determination of transport parameters for light diffusion in white LEDs**
M. Meretska, A. Lagendijk, H. Thyrestrup, T. W. Tukker, A. P. Mosk, W. L. Ijzerman, W. L. Vos
40. **Holographic Doppler imaging of blood flow**
L. Puyo, M. Fink, M. Paques, M. Atlan

List of participants

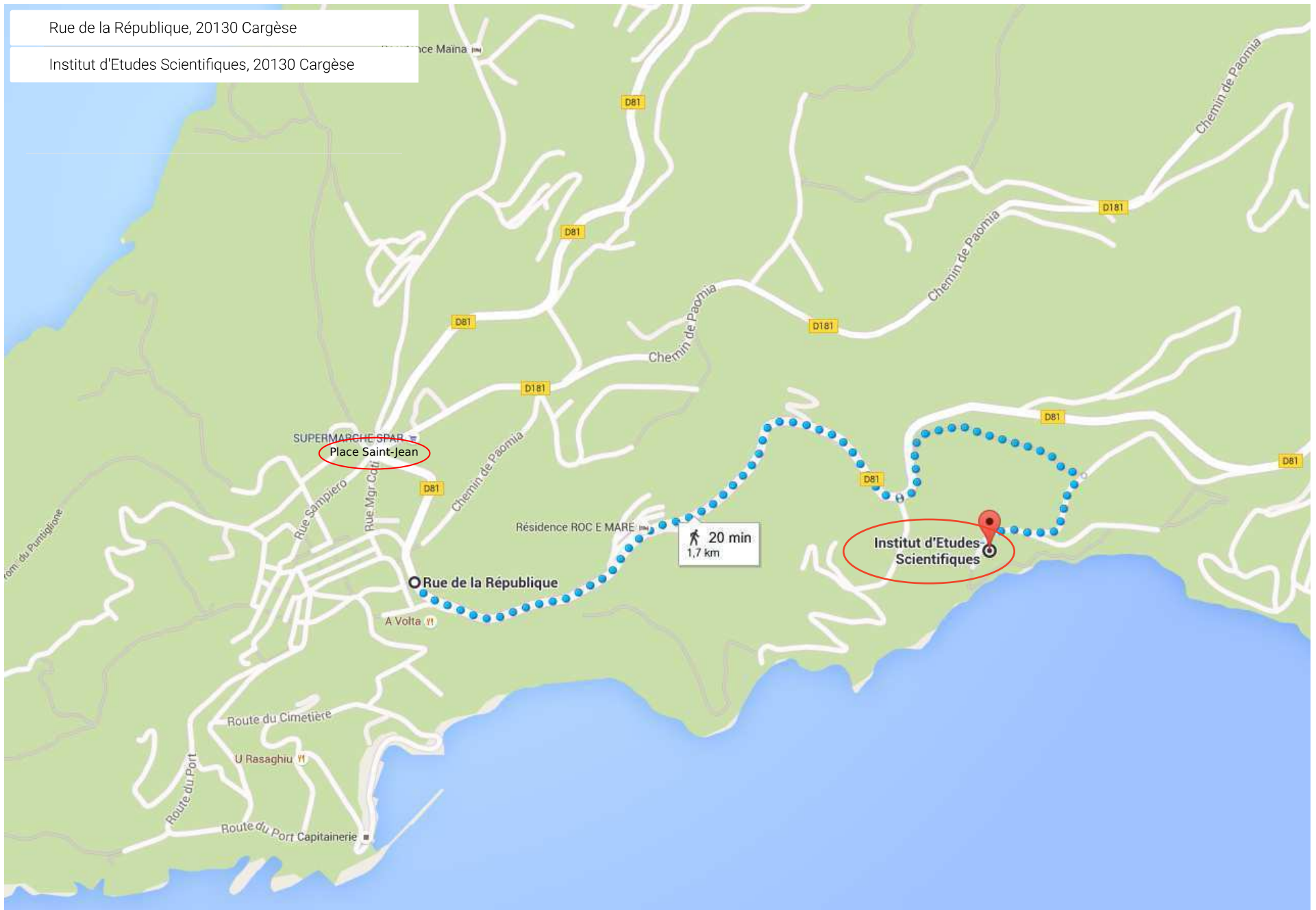
Surname	First name	Affiliation
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Barolle	Victor	Institut Langevin - ESPCI Paris - France
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Bosch	Jeroen	Utrecht University - The Netherlands
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Boucher	Pauline	LKB - ENS Paris - France
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Yilmaz	Hasan	Yale University - USA
Hsu	Chia Wei	Yale University - USA
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Millien	Pierre	Institut Langevin - ESPCI Paris - France
Mounaix	Mickael	LKB - ENS Paris - France
Olmos Trigo	Jorge	Donostia International Physics Center - San Sebastian - Spain
Ott	Felix	ILM - Universität Ulm - Germany
Pai	Pritam	Utrecht University - The Netherlands
Pariente	Gustave	LightOn - France
Penketh	Harry	University of Exeter - UK
Pierre	Juliette	Institut Jean Le Rond d'Alembert - UPMC - France
Poncelet	Olivier	I2M - University of Bordeaux - France
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Premillieu	Evolene	University of Colorado at Boulder - USA
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Cao	Hui	Yale University - USA
Cummer	Steven	Duke University- USA
Eldar	Yonina	Technion - Israel

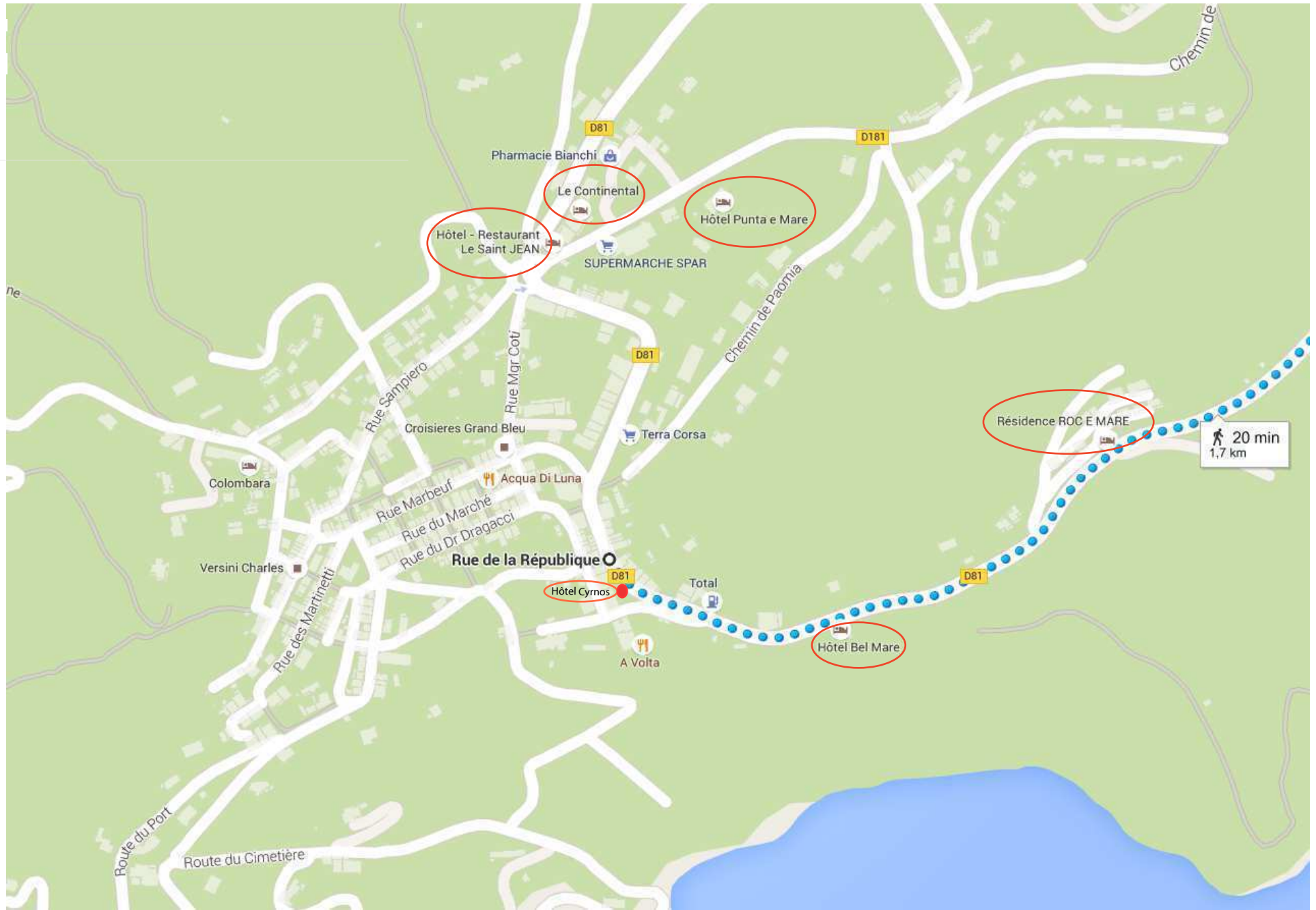
Freilikher	Valentin	Bar-Ilan University - Israel
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Stone	Douglas	Yale University - USA
Wellens	Thomas	University of Freiburg, Germany
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Lerosey	Geoffroy	Institut Langevin - ESPCI Paris - France
Aubry	Alexandre	Institut Langevin - ESPCI Paris - France



Map of the Ajaccio airport and bus meeting point



Route from the village of Cargèse to the Institut d'Études Scientifiques



Zoom on the village of Cargèse and location of the hotels