# Winter School on THERAPEUTIC ULTRASOUND

Les HOUCHES, France

#### March 3th - 8nd 2019

## Information about the School



**Directors:** Gail ter Haar (Sutton), Vera Khokhlova (Moscow) & Jean-Francois Aubry (Paris) **Organized by:** Mathieu Pernot, Thomas Deffieux (Paris)

Mathieu Pernot, Thomas Deffieux (Paris) & Cyril Lafon (Lyon)

#### **Objectives:**

This Winter School will explore the rapidly emerging field of therapeutic ultrasound. Topics will range from an introduction to the physics and biophysics necessary for understanding these techniques through to their clinical application.

The objectives of the School are to provide a current overview of the field as a contextual background for the work of individuals participating; to encourage discussion and shared consideration of different approaches to understanding ultrasound therapy. Participants will be expected to have a sound basis in their own subject at honours degree level or equivalent, and to be active in the study of minimally invasive therapies in the broadest sense. The course will be given at postgraduate level, and we envisage the course being of primary benefit to two groups: One includes PhD students and new post-docs whose research area falls somewhere within the broad sweep of minimally invasive therapy. The other comprises practising clinical scientists, active in one or more areas of the field, who want a better understanding of current techniques and progress, and wish to anticipate new developments. This is a broad and complex topic in which the synergy of a multidisciplinary approach is particularly valuable. The Winter School will encourage this approach. Each topic will be covered by an Invited Speaker who is a world authority in the field.

Location: The institute is located at Les Houches, near Chamonix, in the French Alps, http://houches.ujf-grenoble.fr/

School Sponsors include:







European Society for Hyperthermic Oncology



Acoustical Society of America



# Participants of the School

# Program

| DATE               | TIME   | LECTURER                 | TITLE  | DATE                | TIME                                 | LECTURER  | TITLE  |
|--------------------|--|--------------------------|--|---------------------|--------------------------------------|---|--|
| Sunday             | From 3.00 pm Arrival – Room Keys   |                          |  |                     | Chair: Jean-François Aubry           |   |  |
|                    | 7.15 – 7.30pm JF. Aubry / G. ter Haar / V. Khokhlova Welcome (in the conference room)                    |                          |  | 8.45 - 9.30         | C. Lafon                             | The route to commercialisation                      |  |
| March 3            |  | 7.30 pm                  | Dinner   |                     | 9.30 -10.15                          | B. Werner   | Brain technical                                  |
|                    | 8.45 – 9.00 JF. Aubry / G. ter Haar / V. Khokhlova Welcome/ Overview & introduction                      |                          |  | Wednesday           | Coffee break                         |   | break  |
|                    | Chair: Larry Crum  |                          |  | March 6             | 10.40 -11.15                         | B. Hylander   | Tumour immunology/immunotherapy                  |
|                    | 9.00 -9.45   | R. Cleveland             | Acoustic propagation – soft tissue             |                     | 11.15-12.00                          | H. Gruell   | Ultrasound mediated drug delivery                |
|                    | 9.45 - 10.30   | JF. Aubry                | Focusing Ultrasound                            |                     |                                      | 12.30 L   | unch   |
|                    | Coffee break   |                          |  |                     |                                      | 5.15 pm Coffee                                      |  |
|                    | 11.00 -11.30   | G. ter Haar              | <b>Biophysics: Heating, thermometry</b>        |                     | Chair: J. Hwang                      |   |  |
|                    | 11.30 - 12.15  | R. Roy                   | Biophysics: Cavitation                         |                     | 5.30 - 6.15                          | U.Oelfke  | Competing technologies – ionizing radiation      |
| Monday<br>Moreh 4  | 12.30 Lunch  |                          |  | 1 1                 | 6.15 - 6.45                          | D. Jeanmonod  | Brain clinical                                   |
| March 4            | Chair: Oleg Sapozhnikov  |                          |  |                     | Evening : What y                     | ou always wanted to know about im                   | munology & cancer biology and didn't dare to ask |
|                    | 2 20 / 15  | T. Defferen              | Pasias of US imaging                           |                     | (B Hylander & M Horsman)             |   |  |
|                    | 5.50 - 4.15  | F. Stainmayar            | Basics of MR imaging                           |                     | Chair: Uwe Oelfke                    |   |  |
|                    | 4.13 – 5.00 P. Steinmeyer Basics of MK imaging   |                          |  | Thursday<br>March 7 | 9.00 - 9.45                          | V. Khokhlova  | Histotripsy                                      |
|                    | Chair: Gail ter Haar   |                          |  |                     | 9.45-10.30                           | J. Hwang  | Current applications of HIFU in Oncology         |
|                    | 5.15 - 6.00  | Jean-Luc Guev            | Ultrasound transducers                         |                     |                                      | Coffee  | break  |
|                    | 6.00 - 6.45  | T. Deffieux              | Monitoring & Guidance – US                     |                     | 11.00 - 11.45                        | C. Lafon  | Matching transducer geometry to clinical targets |
|                    |  | 7.00 pm Welcome          | Drink / Dinner                                 |                     | 12.30 Lunch                          |   |  |
|                    |  | Evening : Gluhwein lectu | re - Bubbles (L. Crum)                         |                     | 4.00 pm Coffee                       |   |  |
| Tuesday<br>March 5 | Chair: Florian Steinmeyer  |                          |  |                     | Chair:L. Crum                        |   |  |
|                    | 9.00 - 9.45  | B. Quesson               | Monitoring & Guidance – MR                     |                     | 4.15 - 7.00                          |   | Student presentations                            |
|                    | 9.45 - 10.30   | H. Gruell                | Thermal biology, thermal dose, cavitation dose |                     | Evening : (Table) Football world cup |   |  |
|                    | Coffee break   |                          |  |                     | Chair: Vera Khokhlova                |   |  |
|                    | 11.00 - 11.45  | M. Horsman               | Tumour biology & physiology                    |                     | 8.45 - 9.00                          | Vacate rooms and leave luggage in the main building |  |
|                    | 11.45 - 12.15  | G. ter Haar              | Histology for HIFU                             | Friday              | 9.00 - 9.45                          | O. Sapozhnikov                                      | Calibration & field characterisation             |
|                    | 12.30 Lunch  |                          |  | March 8             | 9.45 - 10.15                         | G. ter Haar   | Experimental design                              |
|                    | 5.00 pm Coffee   |                          |  |                     |                                      | Coffee  | break  |
|                    | Chair: Robin Clevel  | land                     |  |                     | 11.00 - 11.45                        | JF. Aubry   | FDA and CE Approved Devices                      |
|                    | 5.30 -6.15   | L. Crum                  | Cavitation: Applications                       |                     | 11.45 - 12.00                        |   | Closing  |
|                    | 0.15 - 0.45<br>Eva   | M.Horsman                | Hyperthermia & chemo/radiotherapy              |                     | 12:30 Lunch                          |   |  |
|                    | Evening : What you atways wanted to know about MKI and did not dare to ask<br>(F Steinmever & B Ouesson) |                          |  |                     | Departure to the airport             |   |  |
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#### Lecturers

| Lecturer       | Institute                                | Country     |
|----------------|--|-------------|
| J.F. Aubry     | Institut Langevin, Paris                 | France      |
| V. Khokhlova   | Moscow State University, Moscow          | Russia      |
| G. ter Haar    | Institute of Cancer Research, Sutton     | UK          |
| R. Roy         | University of Oxford                     | UK          |
| L. Crum        | University of Washington, Seattle        | USA         |
| M. Horsman     | Aarhus University                        | Denmark     |
| J.L. Guey      | Imasonic, Besançon                       | France      |
| B. Quesson     | Université Bordeaux                      | France      |
| T. Deffieux    | Institut Langevin, Paris                 | France      |
| F. Steinmeyer  | Technische Hochschule Nuremberg          | Germany     |
| C. Lafon       | Lab Tau, Lyon                            | France      |
| 0. Sapozhnikov | Moscow State University, Moscow          | Russia      |
| J. Hwang       | Stanford University                      | USA         |
| D. Jeanmonod   | SoniModul SA                             | Switzerland |
| U. Oelfke      | Institute of Cancer Research, London     | UK          |
| B. Werner      | University Children's Hospital, Zurich   | Switzerland |
| H. Gruell      | Eindhoven University of Technology       | Netherlands |
| B. Hylander    | Roswell Park Comprehensive Cancer Center | USA         |
| R. Cleveland   | University of Oxford                     | UK          |

### Participants from MSU, Russia



O. Sapozhnikov



S. Petrosyan

D. Nikolaev

V. Khokhlova

E. Ponomarchuk

A. Krokhmal

NELLA



J.F. Aubry

V. Khokhlova

#### Lecturers



G. ter Haar



R. Roy



L. Crum



U.Oelfke



H. Gruell



B. Quesson



Deffieux



F. Stenmeyer



C. Lafon



O. Sapozhnikov







M. Horsman D. Jeanmonod J. Hwang B. Hylander J.L. Guey B. Werner R. Cleveland







#### Lecture room



# Accommodation



## Coffee breaks

# Student presentations



# Restaurant

### In the evenings









#### Award Ceremony





#### Best student presentations



Active participation

Active questioner

Youngest participant

