#### Location:

University of Ottawa

#### Dates:

May 27-31, 2009

### Topic:

Langlands Programme, especially the Fundamental Lemma and the Jacquet-Langlands Correspondence

### Methodology:

Three days of mini-courses on recent progress in the field (3 courses, each 4 hours long), followed by two days of one-hour research talks (8 talks).

### **Objectives Achieved:**

The target audience of this workshop was graduate students and postdoctoral fellows. The goal of the workshop was to present the proof of most general version of the Jacquet-Langlands Correspondence currently available, review the proof the most general version Fundamental Lemma currently available, and finally hear from a variety of speakers on other progress in the Langlands Programme. The courses were excellent as were the speakers.

## Scientific Highlights:

Several new collaborations and projects were begun at the workshop, some with a direct bearing on PIMS members. For example, during a talk by Ioan Badulescu (University of Montpellier, France), Julia Gordon (UBC) realized how to prove the local integrability of Harish-Chandra characters of admissible representations in the function field case; this problem has been open since Harish-Chandra's work in the 1960s. A paper on this new result is currently in preparation with Raf Cluckers, Clifton Cunningham and Loren Spice. --- There is some discussion of publishing the proceedings of this workshop, as has been done in the past by the same organisers, in the Fields Institute Monograph Series, published by the American Mathematical Society.

### Organizers:

--- Cunningham, Clifton, Department of Mathematics, University of Calgary --- Nevins, Monica, Department of Mathematics, University of Ottawa

# Speakers:

Please see attached file (abstracts.pdf) for titles and abstracts for these talks. --- Jeffrey D. Adler, American University, Washington, DC --- Ioan Badulescu, University of Montpellier, France ---Pierre-Henri Chaudouard, CNRS, Paris --- Clifton Cunningham, University of Calgary, Canada ---Atsushi Ichino, Institute for Advanced Study, Princeton, NJ --- Syo Kato, Kyoto University, Japan ---Paul Mezo, Carleton University, Ottawa, ON --- Mark Reeder, Boston College, Boston, MA --- Hadi Salmasian, University of Windsor, Windsor, ON --- David Treumann, University of Minnesota, USA

## Links:

http://www.fields.utoronto.ca/programs/scientific/08-09/Langlands/

## Comments / Miscellaneous:

The University of Ottawa was proud to host the Fields Institute Workshop on Geometry Related to the Langlands Programme from May 27 to May 31, 2009. As the title of the workshop suggests, the workshop was largely concerned with applications of algebraic geometry to the Langlands Programme but the focus of the workshop was not so narrow as to preclude exciting recent developments in the field. The atmosphere of the workshop was very lively, with about 40 participants, mainly graduate students and young researchers. All speakers and most participants were funded by the Fields Institute; several participants from Western Canada were funded by the Pacific Institute for Mathematical Sciences. --- The structure of the workshop followed that of two Fields Institute workshops held at the University of Ottawa on admissible representations of p-adic groups in 2004 and 2007: three days of mini-course followed by a weekend conference. Some notes and references were provided by mini-course lecturers before the conference; more detailed versions are currently in preparation. (Lecture notes for 2004 and 2007 workshops are now available in the Fields Institute Monograph Series Volume 26 under the title "Ottawa Lectures on Admissible Representations of Reductive p-adic Groups".) --- Since this workshop was focused on recent applications of geometric tools to the Langlands programme, the first mini-course concerned perverse sheaves. Regrettably, Anne-Marie Aubert, who was slated to give this mini-course, was unable to give these lectures, so Clifton Cunningham and David Treumann stepped in to fill the gap on short notice. Clifton's "character sheaves in six easy steps" will not soon be forgotten! --- The second mini-course consisted of a beautiful series of lectures on the Jacquet-Langlands correspondence by Ioan Badulescu. In just five hours, Ioan Badulescu provided a remarkably comprehensive review of the proof of the most general version of the theorem currently available and earned him a standing ovation. --- The third and final mini-course, given by Pierre-Henri Chaudouard, focused on the geometry of the Hitchin fibration and affine Springer fibres and thus provided key tools necessary to understand Ngo Bao Chau's proof the Fundamental Lemma. In fact, this course went further, including a sketch of the proof of the weighted Fundamental Lemma, due to Pierre-Henri Chaudouard and Gerard Laumon. Pierre-Henri's elegant and meticulous course won the award for the most complete use of all (six) chalkboards available. --- The weekend conference, which featured Jeffrey Adler, Atsushi Ichino, Syo Kato, Paul Mezo, Mark Reeder, Hadi Salmasian, Jeremy Sylvestre and David Treumann, was informal and engaging, with lively give-and-take in several of the talks. Even the local organizer had to defend herself when mocked for giving the promise (on the poster and in the invitations!) that "the weather in Ottawa in May is absolutely lovely", which turned out to be very far from the truth this year. Nevertheless, even constant rain and gray skies could not dampen the spirits of the this tremendously successful workshop.

## File Uploads: