ROLF SCHOCK PRIZE 2011

3 Nov **Mathematics**

The Classification of finite simple groups

Symposium in the honour of the Rolf Schock Prize Laureate in Mathematics Prof Michael Aschbacher. The Beijer Hall, the Royal Swedish Academy of Sciences, Lilla Frescativägen 4A, Stockholm. Open to the public. **Registration is required and must be made before 25 October 2011 at http://kva.se/events.**

Chairs: Torsten Ekedahl & Jan-Erik Roos

12:30	Registration	
13:00-13:05	Opening address	**Prof Staffan Normark,** Permanent Secretary of the Royal Swedish Academy of Sciences
13:05-13:50	The general background and history of the classification of finite simple groups	**Prof John Griggs Thompson,** University of Cambridge, UK
13:55-14:40	Applying the classification in other areas of mathematics	The Rolf Schock Prize Laureate in Mathematics **Prof Michael Aschbacher,** California Institute of Technology, CA, USA
14:40-15:15	Refreshments	
15:15-16:00	Michael Aschbacher's work and the Classification of Finite Simple Groups (CFSG)	**Prof Stephen Smith,** University of Illinois at Chicago, IL, USA
16:05-16:50	A glimpse into the future	**Prof Ronald Solomon,** The Ohio State University, OH, USA
16:50	End of the symposium	

Registered participants are invited to participate in an informal mingle after the symposium

COMPLETE PROGRAMME FOR THE ROLF SCHOCK PRIZE 2011 EVENTS, AVAILABLE AT ***HTTP://ROLFSCHOCKPRIZES.SE***/ AND ***HTTP://KVA.SE***

THE ROLF SCHOCK PRIZE IS AWARDED BY THE ROYAL SWEDISH ACADEMIES OF FINE ARTS, MUSIC AND SCIENCES

KUNGL. VETENSKAPS-AKADEMIEN
THE ROYAL SWEDISH ACADEMY OF SCIENCES

ROLF SCHOCK PRIZE 2011

3 Nov Mathematics

The Classification of finite simple groups; symposium in the honour of the Rolf Schock Prize Laureate in Mathematics Prof Michael Aschbacher. **Registration is required and must be made before 25 October 2011 at http://kva.se/events.**

The general background and history of the classification of finite simple groups

Prof John Griggs Thompson
University of Cambridge, UK

Applying the classification in other areas of mathematics

The Rolf Schock Prize Laureate in Mathematics Prof Michael Aschbacher
California Institute of Technology, CA, USA

There are many applications of the classification of the finite simple groups in many areas of mathematics. I'll briefly mention a few examples, but most of the time will be spent giving some idea of how a problem on finite groups can be reduced to the simple case, and what information about simple groups is then needed to complete the solution.

Michael Aschbacher's work and the Classification of Finite Simple Groups (CFSG)

Prof Stephen Smith
University of Illinois at Chicago, IL, USA

An attempt is made to survey how the classification was finished. A more detailed abstract is given on the enclosed sheet of paper.

A glimpse into the future

Prof Ron Solomon
The Ohio State University, OH, USA

The classification of the finite simple groups leaves open many fascinating questions concerning finite groups, and points toward numerous directions for future investigation. I will highlight some questions in the modular representation theory of groups, notably the Weight Conjecture of Alperin, which in turn focus interest on the category of saturated fusion systems, establishing a new interface between group theory and topology, which is actively being explored by Aschbacher, Chermak, Oliver, and others.

COMPLETE PROGRAMME FOR THE ROLF SCHOCK PRIZE 2011 EVENTS, AVAILABLE AT ***HTTP://ROLFSCHOCKPRIZES.SE***/ AND ***HTTP://KVA.SE***

THE ROLF SCHOCK PRIZE IS AWARDED BY THE ROYAL SWEDISH ACADEMIES OF FINE ARTS, MUSIC AND SCIENCES

KUNGL. VETENSKAPS-AKADEMIEN
THE ROYAL SWEDISH ACADEMY OF SCIENCES

ROLF SCHOCK PRIZE 2011

3 Nov Mathematics

Abstract

Prof Stephen Smith
University of Illinois at Chicago, IL, USA

Michael Aschbacher's work and the Classification of Finite Simple Groups (CFSG)

Since "most" finite simple groups G are in fact matrix groups over finite fields, an early result determining the overall shape of the CFSG was the Dichotomy Theorem---which shows that an abstract simple G (away from cases with 2-subgroups of rank at most 2) is either: of COMPONENT TYPE (resembling a group over a field of odd order), or of CHARACTERISTIC 2-TYPE (resembling a group in characteristic 2).

The treatment of the "odd case", namely component type, was based on Aschbacher's notion of a quasisimple component L of STANDARD FORM, in the centralizer in G of an element t of order 2. The various possible L were treated by Aschbacher and various other researchers.

The treatment of the remaining "even case", namely characteristic 2-type, was obtained via suitable analogies of the above case divisions---but replacing t by an element of ODD prime order p.

Here the initial "small" case corresponds to QUASITHIN groups G; namely where the rank of suitable p-subgroups is at most 2.

This situation involves many complications; it was eventually treated in a lengthy work of Aschbacher and Smith.

For the remaining cases involving p-subgroups of rank at least 3, the above Dichotomy is replaced by a Trichotomy---established by Gorenstein and Lyons (with contributions from Aschbacher).

The three branches which emerge are:

a (p-component) branch called Standard Type;

a (roughly characteristic p-type) branch leading to "GF(2) type"; and a further "disconnected" branch called the Uniqueness Case.

The groups of standard type were determined by Gilman and Griess.

The groups of GF(2) type were determined by various authors, including Aschbacher, Timmesfeld, and Smith.

And the final contradiction in the CFSG (although quasithin groups were chronologically the last to be treated) was established by Aschbacher, who showed that no group can actually satisfy the Uniqueness Case.

(This outline of the Classification of Finite Simple Groups is further developed in a recent book of Aschbacher, Lyons, Smith, and Solomon---Surveys of the AMS vol. 172.)

THE ROLF SCHOCK PRIZE IS AWARDED BY THE ROYAL SWEDISH ACADEMIES OF FINE ARTS, MUSIC AND SCIENCES

KUNGL. VETENSKAPS-AKADEMIEN
THE ROYAL SWEDISH ACADEMY OF SCIENCES