

International Workshop on Computational Algebraic Geometry

(Supported by Dept. of Science and Technology, Govt. of India)

to be jointly organized by

Bhaskaracharya Pratishthana, Pune

&

Harish-Chandra Research Institute, Allahabad

December 8-13, 2003

Venue: **Harish-Chandra Research Institute, Allahabad.**

Organizing committee

Patrons : C. S. INAMDAR, Custodian, B.P., Pune

RAVI KULKARNI, Director, H.R.I., Allahabad

Chairman : R. V. Gurjar, TIFR, Mumbai

Secretary & Treasurer : S. A. Katre, Univ. of Pune

Local Secretary : S. D. Adhikari, H.R.I., Allahabad

Coordinators : Ravi A. Rao, TIFR, Mumbai, J. K. Verma, IIT Bombay

Foreign Members : W. Bruns, Germany, Rekha Thomas, USA

Speakers (Expository Talks)

- | | |
|------------------------|-------------------------|
| 1. W. Bruns, Germany | 2. N. V. Trung, Vietnam |
| 3. I. Swanson, USA | 4. Serkan Hosten, USA |
| 5. A. Conca, Italy | 6. T. Hibi, Japan |
| 7. Diane Maclagan, USA | |

Speakers (Computational Sessions)

- | | |
|------------------------|----------------------|
| 1. Diane Maclagan, USA | 2. Rekha Thomas, USA |
|------------------------|----------------------|

Practical Sessions on Macaulay 2

- | | |
|--------------------------------------|-------------------------------------|
| 1. Amit Khetan (UMass, Amherst, USA) | 2. Leah Gold (Texas A&M Univ., USA) |
| 3. Clare D'Áruz (C.M.I., Chennai) | 4. A. V. Jayanthan (IIT Bombay) |
| 5. Tony Puthenpurackal (IIT Bombay) | |

Academic Programme

Morning Expository Lectures: The morning sessions will consist of three talks each on the following currently active areas of computational and combinatorial commutative algebra/algebraic geometry. The three talks will offer the opportunity to develop these areas from scratch.

The topics and speakers for the morning session are:

Computational commutative algebra

1. Irena Swanson, New Mexico State University, USA, *Primary decompositions*
2. N. V. Trung, Hanoi Mathematical Institute, Hanoi, Vietnam,
Regularity, Local cohomology and reduction numbers
3. Serkan Hosten, San Francisco State University, *Toric Hilbert schemes*

Combinatorial commutative algebra

1. Winfried Bruns, University of Osnabrück,
Linear Diophantine equations and the Anand-Gupta-Dumir conjecture
2. Takayuki Hibi, University of Osaka, Japan
Old topics and current trends in face rings of simplicial complexes
3. Aldo Conca, University of Genoa, Italy,
Applications of the Knuth-Robinson-Schoensted correspondence

The computational school: There will be a computational school in the afternoon session for research students and non-experts coordinated by

Diane Maclagan (Stanford Univ.) and Rekha Thomas (Univ. of Washington), USA.

The school will be based on the book **Gröbner Bases and Convex Polytopes** by Bernd Sturmfels (AMS 1995). The topics in this book provide an ideal combination of combinatorics, algebra and computation. There will be six main lectures in the school, one each day, followed by three to four hours of hands on computational exercises using Macaulay 2 and CoCoa. The main topics are as follows:

- GRÖBNER BASICS
- THE GRÖBNER FAN
- TORIC IDEALS
- TRIANGULATIONS
- MINIMAL FREE RESOLUTIONS .

Tentative timings of the sessions:

1. Morning sessions (expository talks): 9.15 am -10.15 am
10.45 am - 11.45 am
12 noon - 1.00 pm
2. Afternoon and Night sessions:
Lecture : 2.30 pm - 3.30 pm
Practicals : 4.00 pm - 6.00 pm
9.00 pm - 11.00 pm

Applications in the prescribed format are invited from research students and University/ College teachers with background in Commutative Algebra, not later than **20th October, 2003**.

The applications should be sent to

The organizer, CAG Workshop,
C/o, Bhaskaracharya Pratishthana,
56/14, Erandavane, Damle Path,
off Law College Road, Pune-411 004.

Advance copy of the application may be sent by e-mail to bhaskara_p@vsnl.com

- ◇ Selected Indian participants are required to pay a registration fee of Rs. 500/-.
- ◇ The lodging and boarding facilities will be provided to all the participants.
- ◇ Selected Indian participants will be given to and fro 2nd sleeper train expenses.

Any queries regarding the workshop may be addressed to S. A. KATRE at

sakatre@math.unipune.ernet.in or bhaskara_p@vsnl.com

The participants are expected to familiarise themselves with the concept of Gröbner bases.

See the notes of W. Decker from the web page of Prof. J. K. Verma

<http://www.math.iitb.ac.in/~jkv/acag/> .

In the same webpage there are notes by B. Adsul, Jayanthan and Clare D’Cruz on Macaulay 2.

For basic polytope theory we recommend :

1. Günter Ziegler, Lectures on Polytopes, Graduate Texts in Mathematics 152, Springer-Verlag New York 1995, 370 pages; Revised edition 1998. (It would be enough to look through Chapters 0, 1 and 2)
2. M. Henk, J. Richter-Gerbert and G. Ziegler, Basic properties of convex polytopes, in J.E. Goodman and J. O’Rourke editors, CRC Handbook on Discrete and Computational Geometry, Chapter 13, pages 243-270, CRC Press, Boca Raton, FL 1997.

This article can also be downloaded from

<http://www.math.tu-berlin.de/~ziegler/>

Along with the above workshop an International Conference on Commutative Algebra and Combinatorics is also being organised at H.R.I. Allahabad, jointly by Bhaskaracharya Pratishthana and HRI during 8-13 Dec., 2003. For more information about this conference and also about the CAG workshop visit <http://education.vsnl.com/bp/> or www.bprim.org .

General Information

The goal of this workshop is to bring together researchers and students in combinatorial and computational commutative algebra/algebraic geometry from around the world with the algebraists in India, and to give a broad exposure of computational and combinatorial methods in algebra that is now an integral and active area of research in the west to the students and researchers working in India.

The BHASKARACHARYA PRATISHTHANA has taken a leading role in advancing computational algebra in India to complement the strong tradition in algebra and algebraic geometry that India is famous for. This will be the third workshop that Bhaskaracharya Pratishthana is going to organise in this series. The first such workshop was held in Pune in December 1999 on as an **Instructional Workshop on Algorithms in Invariant Theory and Algebraic Geometry** as a joint activity with Dept. of Mathematics, University of Pune, Pune and the second workshop was held at HRI (as a joint activity) during 2-11 January, 2003 on **Computational Aspects of Algebraic Geometry**. The latter was conducted by Professors Wolfram Decker and Christoph Lossen from Germany. An information about this and previous such computational workshops organised by Prof. Decker is available on his homepage <http://www.math.uni-sb.de/~ag-decker/>.

The current Workshop is motivated by the success of these past workshops and the unique opportunity that the AMS meeting in India (17-21 Dec. 2003) provides to attract international researchers to the country in December 2003. The AMS meeting will have a special session in Commutative Algebra organized by Hema Srinivasan (University of Missouri) and J. K. Verma (IIT Bombay) which will attract many international participants. As the emphasis of that meeting will be on more mainstream Commutative Algebra, this meeting is being planned as its Computational and Combinatorial complement.

The workshop is being designed to maximize the effectiveness of its tutorial component. The program is divided into two main parts: Morning Expository Sessions and Afternoon and Night Computational Sessions.

The speakers are expected to produce lecture notes that will be distributed to the participants. These notes will also appear in a proceedings of the workshop. The lectures are intended to teach the basics of the material in the book **Gröbner Bases and Convex Polytopes** by Bernd Sturmfels (AMS 1995). Each day's lecture and computer exercises will be written up as lecture notes interspersed with computer exercises and scripts in the style of the recent book **Computations with Macaulay 2** (eds: Eisenbud, Grayson, Stillman and Sturmfels) Springer 2001. We hope to publish these notes as a computational companion to Sturmfels' book.

International Workshop on Computational Algebraic Geometry
Jointly Organized by Bhaskaracharya Pratishthana, Pune & H. R. I., Allahabad.
8 December, 2003 - 13 December, 2003.

Application Proforma

Name :

Age: M/F

Organization:

Address (for communication)-

Email ID:

Tele.(Res.)

Tele.(Off.)

Fax:

Educational qualifications:

Topics of Interest:

Background in Comm. Algebra/Alg. Geometry (Books read/courses done etc.) :

Name of the research guide (in case of res. student):

Recommendation from research guide:

Titles of Research Papers - upto 5 (if any):

Date and Signature:

Note: The selected participants are required to pay a registration fee of Rs. 500/-.

◇ The lodging and boarding facilities will be provided to all the participants.

◇ Selected Indian participants will be given to and fro 2nd sleeper train expenses.

The last date of submitting the application is 20th October, 2003.

The application should be sent to:

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Pune 411004.

Phone: 020-5434547 / 5410724

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