

2014

international year of  
crystallography



United Nations  
Educational, Scientific and  
Cultural Organization



International  
Union of  
Crystallography

Partners for the International Year of Crystallography 2014

IUCr / IYCr Legacy

# The legacy of the International Year of Crystallography



*Under the High Patronage of His Majesty the King Mohamed VI*

jointly organized by

International Union of Crystallography, IUCr  
Moroccan Crystallographic Association, AMC



## Building Capacity in Crystallography

- ✓ History, Organization and Services of the IUCr
- ✓ IYCr 2014 Activities
- ✓ IUCr - Support for Building Capacity in Crystallography

# 1948 First IUCr Congress & General Assembly, Harvard, USA

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IUCr beginnings



- 1947 the IUCr, founded after an idea of P.P. Ewald, is accepted into ICSU
- 1948 the first elected President by the General Assembly is W.L. Bragg
- 1948 the first issue of *Acta Crystallographica* is released

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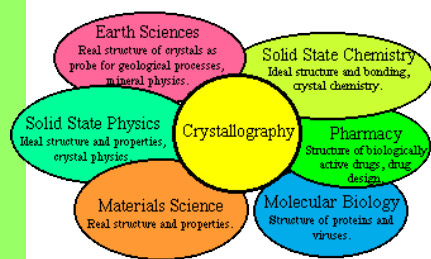
IUCr Aims



IUCr  
Aims



promote international cooperation in  
crystallography



form a focus for the  
relations of  
crystallography to  
other sciences.



promote  
international  
publication of  
crystallographic  
research



contribute to the  
advancement of  
crystallography in all  
its aspects, including  
related topics  
concerning the non-  
crystalline state

$P2_12_12$

facilitate standardization of  
methods, units, nomenclatures  
and symbols



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IUCr EC (2011-2014)

## IUCr Executive Committee plus – Leuven 2013



***Front Row: Elena Boldyreva, Malcolm Cooper, Claude Lecomte, Gautam Desiraju, Luc Van Meervelt, Sine Larsen; Back Row: Jane Robinson, Manuel Perez-Mato, Marvin Hackert, Wulf Depmeier, Mitchell Guss, Michael Dacombe, Michele Zema, Samar Hasnain, Peter Strickland, and Hanna Dabkowska.***

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IUCr EC (2014-2017)

## IUCr Executive Committee (2014 – 2017)



**Front Row: Hanna Dabkowska , Luc Van Meervelt (Sec./Teas.), Marvin Hackert (President), Mike Glazer (Vice-Pres.), and Gautam Desiraju (Past-Pres.); Back Row: Malcolm Cooper (Fin. Comm.), Michael Dacombe (Exec. Sec.), Mitchell Guss, Radomir Kuzel, Masaki Takata, Wulf Depmeier, and Santiago Garcia-Granda.**



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IUCr Quick Facts



# IUCr Facts

(updated July 2014)

53 member countries

42 adhering Bodies (including 4 regional Associates)

23 commissions

9 journals (IUCrJ launched in 2014)

IUCr Congress every 3 years:

23<sup>rd</sup> IUCr Congress, Montréal, August 2014

24<sup>th</sup> IUCr Congress, Hyderabad, India 2017

25<sup>th</sup> IUCr Congress, Praha, Czech Rep. 2020

since 1947

The IUCr is a member of



# The World of Crystallography

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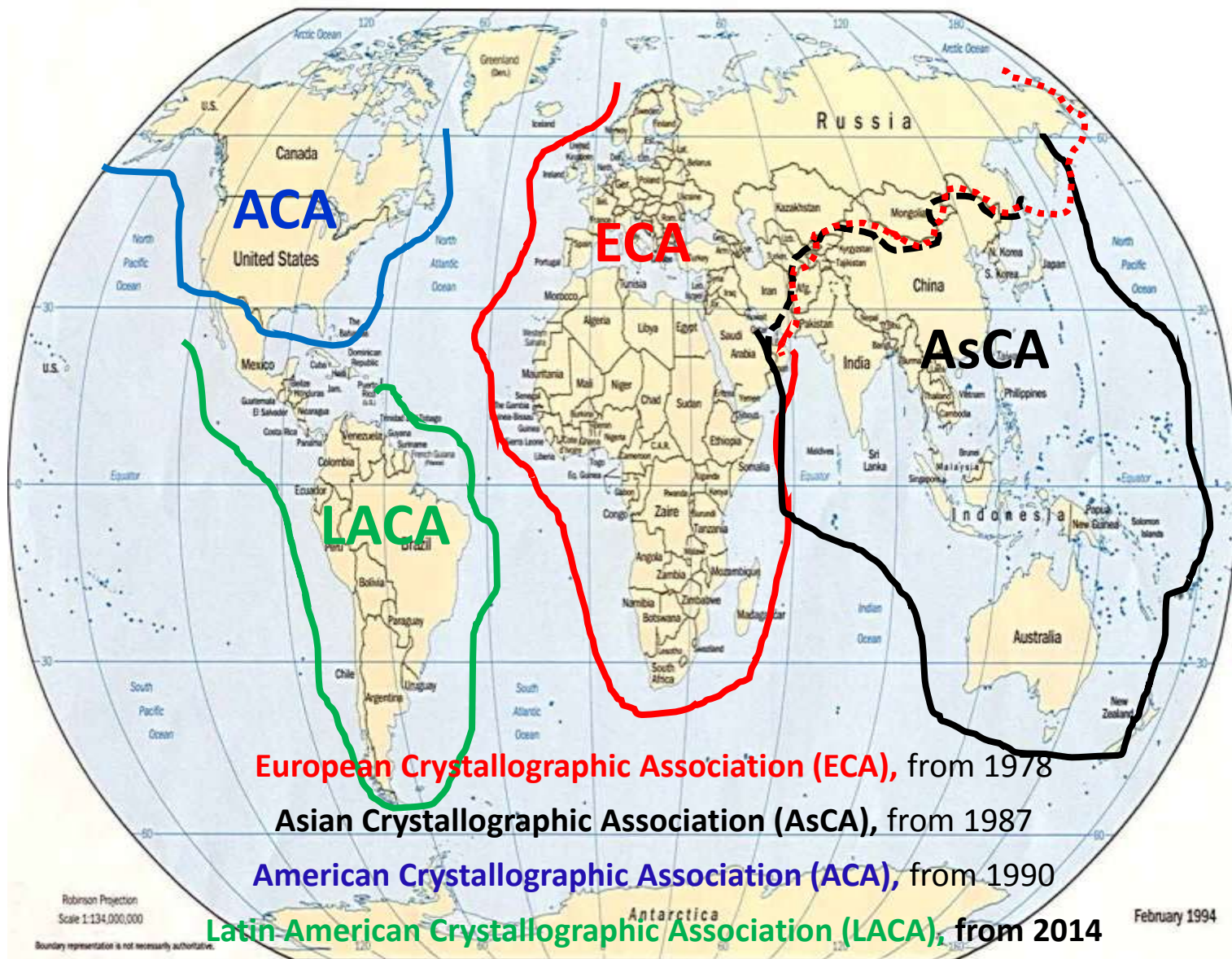
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Regional Associates



Regional Associates of the IUCr

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IUCr Commissions

**The scientific work of the IUCr is conducted primarily through its Commissions. Each Commission comprises a group of scientists who report to the Executive Committee on a particular subject area, maintain website, organize scientific sessions, etc.**

- Commission on Aperiodic Crystals
- Commission on Biological Macromolecules
- Commission on Charge, Spin and Momentum Densities
- Commission on Crystal Growth and Characterization of Materials
- Commission on Crystallographic Computing
- Commission on Crystallographic Nomenclature
- Commission on Crystallographic Teaching
- Commission on Crystallography in Art and Cultural Heritage
- Commission on Crystallography of Materials (*ad interim*)
- Commission on Electron Crystallography
- Commission on High Pressure
- Commission on Inorganic and Mineral Structures
- Commission on International Tables
- Commission on Journals
- Commission on Magnetic Structures
- Commission on Mathematical and Theoretical Crystallography
- Commission on Neutron Scattering
- Commission on NMR Crystallography and Related Methods
- Commission on Powder Diffraction
- Commission on Small-Angle Scattering
- Commission on Structural Chemistry
- Commission on Synchrotron and XFEL Radiation
- Commission on XAFS



2014

# IUCr journals

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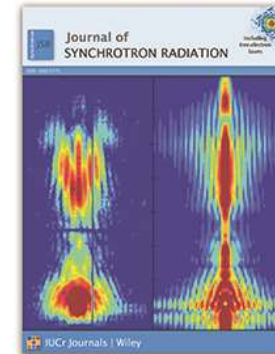
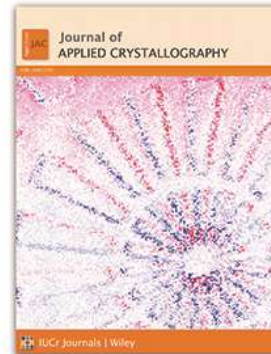
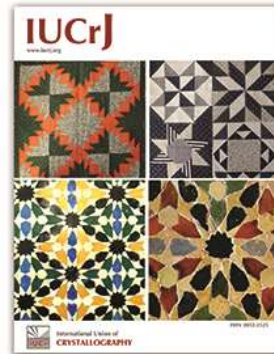
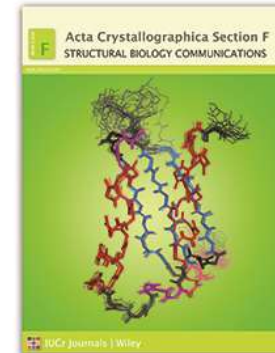
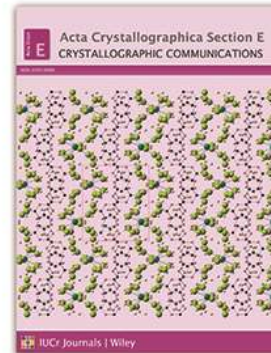
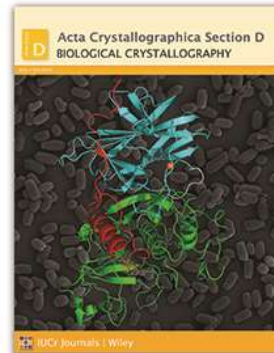
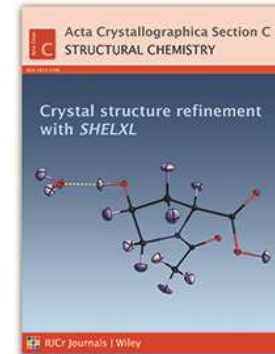
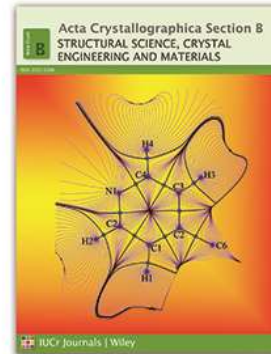
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IUCr Journals



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IUCr Journals

# IUCr journals

## Full open-access journals

The IUCr publishes *two journals that are fully open access, i.e.* all articles are made available *free of charge to the reader*. An open-access fee is charged to authors of articles published in these journals to cover the costs of peer review, journal production, and online hosting and archiving. These journals are:

- ***Acta Crystallographica Section E: Structure Reports Online***
- ***IUCrJ***

## Hybrid open-access journals

Authors can choose to make their article open access by paying an open-access fee.

*Funds generated from open-access payments are used to keep subscription costs as low as possible.*

## waiving of open-access fees

Authors from developing countries may apply for their open-access fees to be waived. Also, Wiley has programs that provide free or low-cost on-line access to the journals in developing countries.

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International Tables



# International Tables for Crystallography

**Volume A** Space-group symmetry

**Volume A1** Symmetry relations between space groups

**Volume B** Reciprocal space

**Volume C** Mathematical, physical and chemical tables

**Volume D** Physical properties of crystals

**Volume E** Subperiodic groups

**Volume F** Crystallography of biological macromolecules

**Volume G** Definition and exchange of crystallographic data

**Volume H** Powder diffraction



*to be released soon!*



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# Newsletters



## Newsletters

INTERNATIONAL UNION OF  
**Crystallography**  
NEWSLETTER

- ✈ Published 4 times per year
- ✈ Available online free of charge
- ✈ Alerts sent to all those registered with the WDC
- ✈ Circulated to over 200 different countries around the world

## Contents

- ✈ Letters
- ✈ General news
- ✈ Awards
- ✈ Elections
- ✈ Useful resources and databases
- ✈ Event calendar and event reports
- ✈ Book reviews
- ✈ Comments and opinions



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Directory

# World Directory of Crystallographers

*Facilitating communication within the crystallographic community*

<http://www.iucr.org/people/wdc>

Launched in 1957, the database currently has **20,000 entries**.

To sign-up is free, and members of the directory have access to large network of scientists practising in similar and related fields of interest, tying together research topics, scientists and institutions in one easy to search database.

**Ideal if you are looking for collaborators** in other laboratories around the world or trying to find researchers with a general or detailed research background.

The database allows you to **create your own unique profile**, add your photo, research interests and papers published.

Manage subscriptions to journal e-alerts and the IUCr Newsletter from your profile, as well as enjoying the special offers on publications and services from time to time.

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Sponsorships

# IUCr sponsorships

The IUCr currently sponsors scientific activities and meetings in a number of ways:

- Bursary scheme for meetings of Regional Associates
- Visiting Professorships
  - The IUCr Visiting Professorship scheme aims to support some of the costs of having internationally recognized scientists as lecturers for short courses at workshops or schools organized in developing countries.
- Scientific conferences and workshops
- Journal subscriptions
- Crystallography in Africa



# IUCr initiative since 1999

## Crystallography in Africa

Approved by the IUCr Executive Committee following a proposal of Jan Boeyens from South Africa

- ✓ crystallography lecture series and schools
- ✓ bursaries awarded to African students to attend meetings of the IUCr Regional Associates
- ✓ bursaries for young professors (up to the age of 40), post-doctoral students and PhD students from Africa to attend an IUCr Congress
- ✓ instrumentation supplied free of charge by partner companies



### Steering Committee

Claude Lecomte (Chair)  
Patrice Kenfack  
Luc Van Meervelt  
Hocine Merazig  
Romain Murenzi (TWAS)  
Jean Paul Ngome (UNESCO)  
Andreas Roodt  
Abdelmalek Thalal  
Michele Zema

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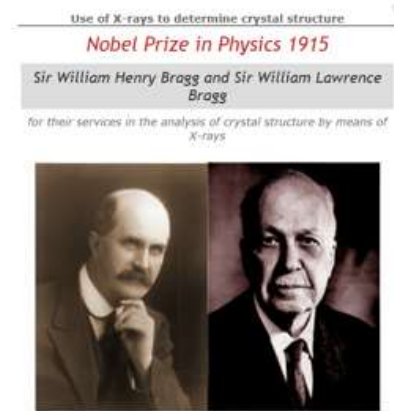
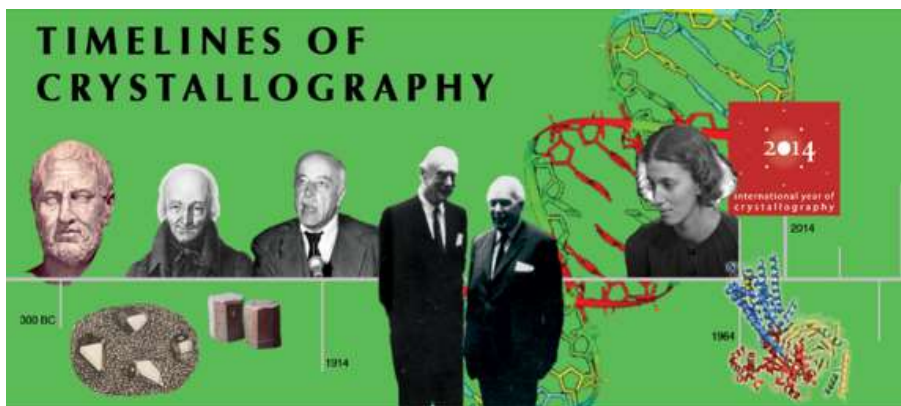
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IYCr Web Site

# IYCr Activities

- ✓ IUCr / IYCr web site - an educational resource for the future



## Timelines of Crystallography

1. Click on the buttons to show or hide timelines (up to 5 can be shown side by side)

**Nobel Prizes** **Man's fascination with crystals** **The Royal Institution** **Geometric crystallography** **Physical crystallography** **Chemical crystallography** **Structure determination**

Crystallographic information

2. Drag the timeline or select a date: 1500 | 1600 | 1700 | 1750 | 1800 | 1850 | 1900 | 1950 | 1975 | 2000 | 2010 | 2014

3. Show ("filter") or highlight entries containing a given word

Filter:  Highlight:

1914

- Discovery of X-rays
- Discovery of the characteristic Röntgen radiation of the elements
- Use of X-rays to determine crystal structure
- Diffraction of X-rays by crystals

<http://www.iycr2014.org/timeline>

1900

- Experiments on X-ray diffraction
- Theory of X-ray diffraction
- $2d \sin \theta = n \lambda$
- First structure determination
- Reciprocal lattice
- Corrected intensities
- Friedel law
- Contribution to the interpretation of X-ray diffraction patterns
- Spinel structures
- Integrated reflections; X-ray scattering by imperfect crystals

1920

- Determination of unit-cell content
- Fourier series to represent electron density
- Powder photographs

# Crystallography matters ... more!

✓ **IUCr / IYCr web site - an educational resource for the future**

events and outcomes from the  
international year of crystallography



- ✦ Declarations
- ✦ Reports
- ✦ News archive
- ✦ Media kit and coverage
- ✦ Videos
- ✦ Photo galleries
- ✦ PPT presentations
- ✦ Books
- ✦ Educational resources
- ✦ Collection of stamps
- ✦ Timelines of crystallography
- ✦ Crystallography365
- ✦ Gallery of crystals
- ✦ Partners
- ✦ New projects (to be continued)

The screenshot shows the IYCr website with a prominent red banner for the 2015 conference. The banner text reads: "2015: Crystallography matters ... more! CONFERENCE Crystallography for the next generation: the legacy of IYCr Hassan II Academy of Science and Technology, Rabat (Morocco) 22-24 April 2015 www.iycr2014.org/legacy/conference". Below the banner, a "Latest news" section states "300 participants from 44 countries already registered". The left sidebar lists "IYCr Supporters" under categories: Commercial, Organizations, and Large scale facilities. The right sidebar contains "Coming events", "Ongoing exhibitions", "La Cristallographie of Morocco", "Crystallography exhibition", and "Crystals at regg 8".

... and quite a large  
facebook community





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IYCr Activities

# IYCr Activities

- ✓ Education - public awareness / outreach



# ✓ Education - public awareness / outreach

Explore UT\_2014

Crystals & Crystallography – IYCr2014



<http://iycr2014.org/>

## Growing Crystals at Home

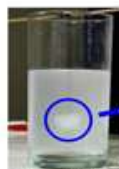
It is relatively easy and fun to grow crystals of common chemicals at home with a minimum of time and effort. Three of the favorite crystals to grow at home are alum (a common spice that can be obtained at most grocery stores), Borax (common detergent), and copper sulfate (used as a root killer). Crystals grow by a process termed *nucleation* from saturated or supersaturated solutions.

Step 1: Buy Alum at grocery store



Step 2: Make a saturated solution

Step 3: Grow seed crystal

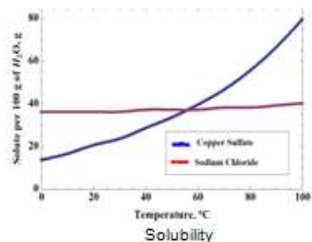


Step 4: Add seed crystal to saturated solution to continue its growth

Alum crystal

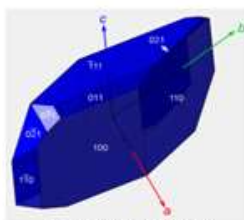


How much material it takes to make a saturated solution depends on the solubility of the substance. Most materials are more soluble in hot solutions, but the range varies a lot. For example, the solubility of common table salt ( $\text{NaCl}$ ) increases by less than 10% between room temperature and the boiling point of water, whereas the solubility copper sulfate increases by over 4-fold over this same temperature range (see graphs below taken from Ref.1 Dom's crystal growing webpage:).



Salt ( $\text{NaCl}$ ) Crystals

$\text{NaCl}$   $\text{Fm}\bar{3}\text{m}$ ,  $a = 5.64 \text{ \AA}$



Copper Sulfate Crystal

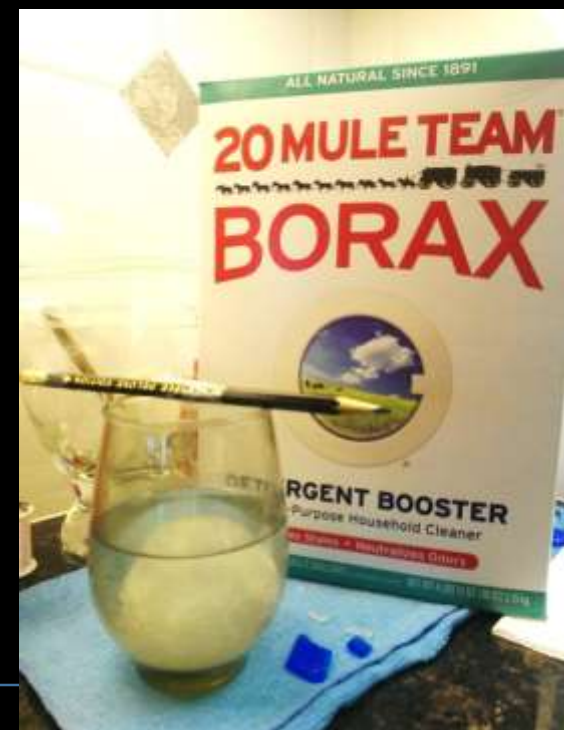
$\text{CuSO}_4$   $\text{P1}$  ( $Z = 2$ )  
 $a = 6.11 \text{ \AA}$ ,  $b = 10.71 \text{ \AA}$ ,  $c = 5.96 \text{ \AA}$   
 $\alpha = 82.4^\circ$ ,  $\beta = 107.3^\circ$ , and  $\gamma = 102.6^\circ$

There are many web links and [youtube](#) videos to show you how to grow crystals at home. Below are just a few links to detailed steps on how to grow crystals at home. The alum crystal shown below at right was grown in less than 2 days.

References:

Dom's crystal growing webpage: <http://www.homepages.ucl.ac.uk/~ucfban1/general/crystal.htm>  
About.com / chemistry / crystal facts: <http://chemistry.about.com/od/crystalfacts/>  
About.com / crystal recipes: <http://chemistry.about.com/od/crystalrecipes/>  
Borax snowflake crystals: <http://video.about.com/chemistry/Borax-Crystal-Snowflakes.htm>  
Large Alum crystals on youtube: <http://www.youtube.com/watch?v=RnjEidoSEvA>  
Sodium acetate supersaturated solutions: <http://www.youtube.com/watch?v=D1PDE5Oawul>

Alum Crystal







✓ Education - public awareness / outreach



<http://iycr2014.org/>

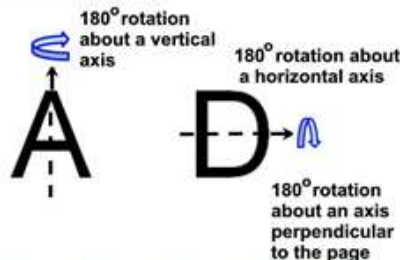
**Bilateral symmetry**, where the left and right sides are mirror images of one another, is common in nature such as seen in butterflies and snowflakes - and has also been a common feature of architecture.



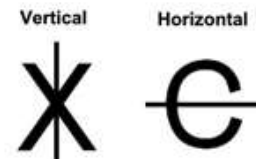
## Symmetry

Symmetry is integral to understanding crystals and crystallography. Something is symmetrical when it has similar parts: e.g. one part is the same as another part. The most **common** forms of symmetry are rotation axes and mirror planes. Symmetry can be observed all around us, even in our alphabet!

### 2-Fold Rotations



### Mirror Planes



Now consider the alphabet shown below:

- 1) How many letters have no symmetry? \_\_\_\_\_. Place an "X" in the upper left box of letters with no symmetry.
- 2) How many letters have a vertical axis of symmetry? \_\_\_\_\_. Draw a vertical arrow indicating the symmetry axis.
- 3) How many letters have a horizontal axis of symmetry? \_\_\_\_\_. Draw a horizontal arrow indicating the symmetry axis.
- 4) How many letters are symmetrical about a 2-fold rotation axis perpendicular to the plane of the page? \_\_\_\_\_. Place a (☑) mark in the upper right box of those letters with a perpendicular 2-fold rotation axis, and a "dot" indicating the location of the rotation axis.
- 5) Now identify the symmetry present in the two words in the last two frames.

*Answers are given on other side, but note results can vary with the font used!*

<input type="checkbox"/>	A	<input type="checkbox"/>	B	<input type="checkbox"/>	C	<input type="checkbox"/>	D	<input type="checkbox"/>	E	<input type="checkbox"/>	F	<input type="checkbox"/>	G	<input type="checkbox"/>
<input type="checkbox"/>	H	<input type="checkbox"/>	I	<input type="checkbox"/>	J	<input type="checkbox"/>	K	<input type="checkbox"/>	L	<input type="checkbox"/>	M	<input type="checkbox"/>	N	<input type="checkbox"/>
<input type="checkbox"/>	O	<input type="checkbox"/>	P	<input type="checkbox"/>	Q	<input type="checkbox"/>	R	<input type="checkbox"/>	S	<input type="checkbox"/>	T	<input type="checkbox"/>	U	<input type="checkbox"/>
<input type="checkbox"/>	V	<input type="checkbox"/>	W	<input type="checkbox"/>	X	<input type="checkbox"/>	Y	<input type="checkbox"/>	Z	<input type="checkbox"/>	MOM	<input type="checkbox"/>	MOW	<input type="checkbox"/>



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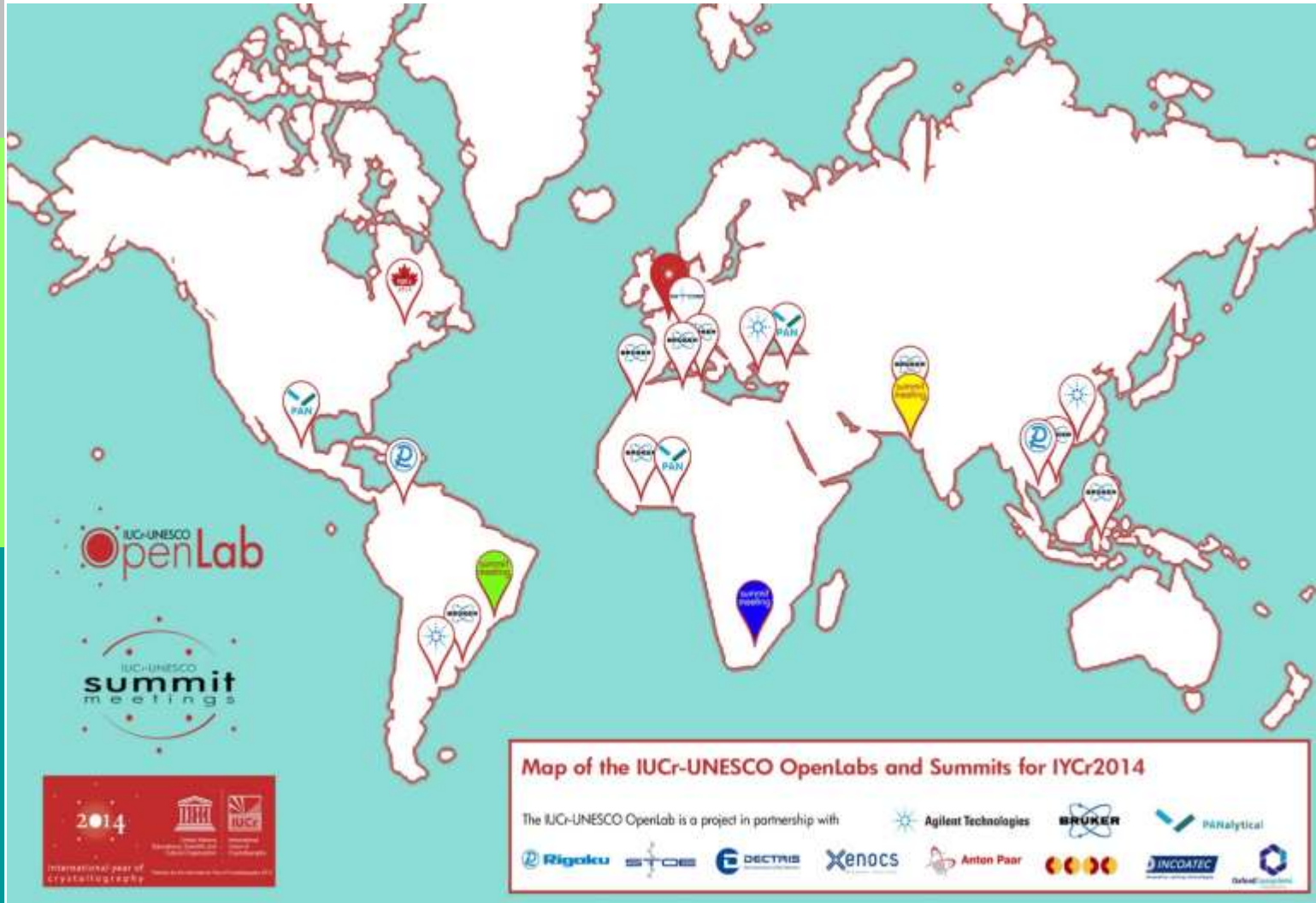
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Open Labs

# IYCr Activities

- ✓ Building capacity – OpenLabs / workshops / summits



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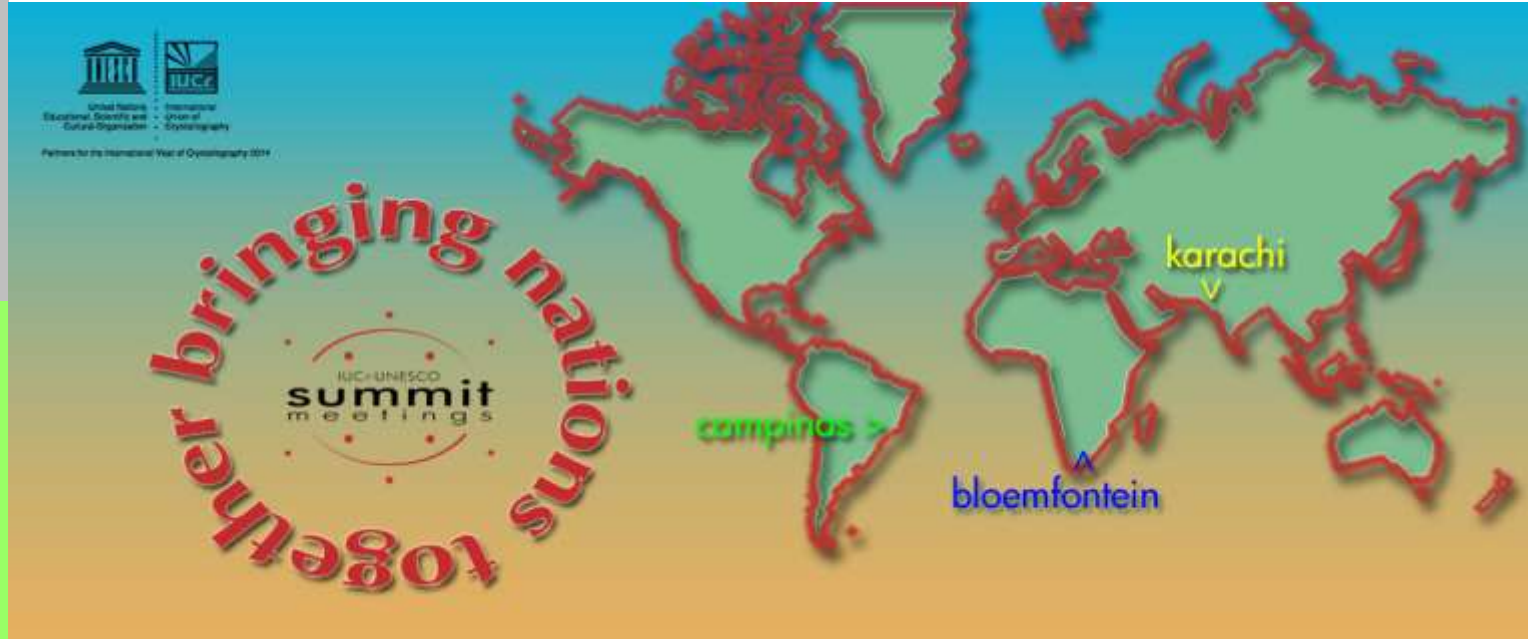
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Summits

# IYCr Activities - summits



□ Asia: Karachi (Pakistan), 28-30 April 2014

Vistas in Chemical crystallography

□ Latin America: Campinas (Brazil), 22-24 Sept 2014

Biological Crystallography and complementary techniques

□ Africa: Bloemfontein (South Africa), 15-17 Oct 2014

Crystallography as vehicle to promote Science in Africa and beyond

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Summits

# summit meetings

Karachi (Pakistan), 28-30 April 2014

## Vistas in Structural Chemistry



Venue: International Center for Chemical and Biological Sciences (ICCBS),  
University of Karachi, Pakistan

Dates: 28-30 April 2014

### Jointly organized by:



Ministry of Science and Technology (MoST),  
Government of Pakistan



Pakistan Academy of Sciences (PAS)



Indian National Science Academy (INSA)



Chinese Academy of Sciences (CAS)



Commission on Science and Technology for  
Sustainable Development in the South (COMSATS)

### Sessions

*Metal-Organic Framework Compounds (MOF)*

*Crystal Engineering and Generic Pharmaceuticals*

*Chemistry-Biology Interface and Drug Discovery and  
Designing*

*Crystallography and complementary methods*

*IUCr: Union & Journals*

*Mini-Talks Session*

### Summit lecture

**Prof Dr Atta-ur-Rahman**, *Promotion of higher education,  
science and technology and international cooperation in  
Pakistan*

### Three Panel discussions





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IUC-UNESCO Karachi, 28-30 Apr 2014

**summit**  
meetings



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Summits

# summit meetings

Karachi (Pakistan), 28-30 April 2014

Vistas in Structural Chemistry

## South Asia Summit

### IYCr2014 South Asia Summit Declaration

The IYCr2014 South Asia Summit Declaration took the form of an Appeal letter, with 53 signatories, addressed to the President of the IUCr. The letter is published below.



Initial signatures of the Summit Declaration. Seated at table (from left): H. Dyal Choudhary, Pakistan; Chakrabarti, Zhi Jie Liu, Atta-ur-Rahman.

### Appeal

Prof. Gaston Desiraju  
International Union of Crystallography  
UK

29th April, 2014

Dear President:

We are pleased to report that the IYCr South Asia Summit Meeting on Vistas in Structural Chemistry in Karachi, Pakistan (during April 28-30, 2014), has provided us an opportunity to extensively discuss and review the status of education and research in X-ray diffraction systems in various countries and in the region.

Over 300 senior researchers and young students from some 22 countries have participated in the event. Many of us were engaged in extensive discussions focusing on the promotion of regional and international cooperation in the field of X-ray diffraction/crystallography/drug design and discovery, in line with the objectives of the International Year of Crystallography.

Through this letter, we request the IUCr to initiate actions to promote regional scientific collaboration including joint holding of training workshops, video-based lecturing, encouraging mobility of researchers, promoting joint research projects, leveraging national bodies and institutions for financial support and facilitating regional conferences on the subject of X-ray diffraction and its applications in the South Asian and East Asian regions.

With very best regards  
Sincerely yours

**Atta-ur-Rahman** Karachi University  
**Pinak Chakrabarti** Bose Institute, India  
**Zhi Jie Liu** Shanghai Tech. University  
**H. Dyal Choudhary** ICCBS, Karachi, Pakistan  
**Siddhartha P. Sanyal** IISc, Bangalore  
**Christian Betzel** University Hamburg, Germany  
**Bam Vishwakarma** I.I.T.M. CSIR  
**P. K. Shandeeq** IIT Kharagpur  
**H. Aslam Baig** NCP Islamabad  
**C. H. Ashraf** SSC Pakistan (Section Lahore)

**Abdul Rauf Siddiqi** COMSATS, CIT, Islamabad  
**A. Ramanan** IIT, Delhi  
**S. Natarajan** IISc, Bangalore  
**Ahya Abbas** HEI Res. Inst. Chem. (ICCSB)  
**Bina S. Siddiqui** HEI Res. Inst. Chem. (ICCSB)  
**Fahim Z. Basha** HEI Res. Inst. Chem. (ICCSB)  
**SRI Fatma** Universiti Kebangsaan Malaysia  
**Mohd Yusoff Akram Attari** Biology, Bahauddin Zakariya University  
**Abida** Dept of Chemistry, Uni. of Cambridge,

**S. Abid Ali** HEI  
**Bilal Aze Jamal** Department of Chemistry, University of Karachi  
**Dr Huma Aalam Bhatti** ICCBS  
**Dr Huzar ur Rahman** NIGD, Pak.  
**Dr Humair Ali** Dept of Chemistry, University of Malakand, Pakistan  
**Prof. Dr Sabira Begum** ICCBS, Univ. of Karachi  
**Dr Umar Farooq** COMSATS  
**Dr Syed Ghulam Nusrat** ICCBS  
**Dr Farhan A. Khan** COMSATS  
**Dr Abdul Hamud** ICCBS

“We request the IUCr to initiate actions to promote **regional scientific collaboration** including ... leveraging national bodies and institutions for **financial support** and facilitating **regional conferences** on the subject of X-ray diffraction and its applications in the South Asian and East Asian regions.”

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Summits

# summit meetings

Campinas (Brazil), 22-24 September 2014

Biological Crystallography and Complementary Methods



Venue: Brazilian Synchrotron Light Laboratory (LNLS), Campinas, Brazil

Dates: 22-24 September 2014

*Sponsored by:*



National Centre for Research in Energy  
and Materials



Brazilian Synchrotron Light Laboratory



Brazilian Bioethanol Science and  
Technology Laboratory



Brazilian Biosciences National  
Laboratory



Brazilian Nanotechnology National  
Laboratory



Federal Government of Brazil

## Sessions

*Historical Perspective on Protein Crystallography in Latin America*

*Biological Crystallography*

*Complementary Techniques*

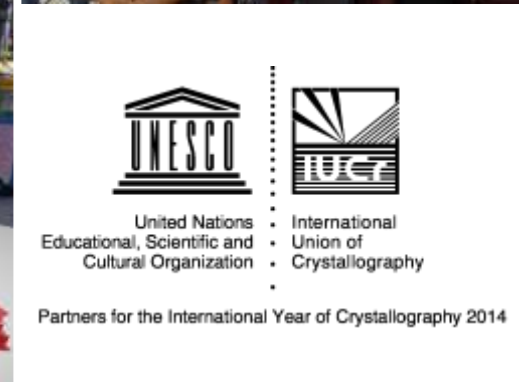
*A View from Abroad: Latin Americans Working Overseas*

## Keynote lecture

**Ada Yonath** *Can structures lead to advanced therapeutics?*

## Panel discussions





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Summits

# summit meetings

Campinas (Brazil), 22-24 September 2014

## Biological Crystallography and Complementary Methods



Prof. Marvin Hackert, President, International Union of Crystallography  
Prof. Lidia Brito, Regional Director, UNESCO

Dear Colleagues

24<sup>th</sup> September 2014

We are pleased to report that the IYCr Latin America Summit Meeting on Biological Crystallography in Campinas, Brazil during September 22-24, 2014, has provided us an opportunity to extensively discuss and review the status of education and research in X-ray diffraction sciences in various countries in the region.

Over 100 senior researchers, early career researchers, post-doctoral fellows and students from 12 countries have participated in the event including a number of well established scientists in the North (Europe and USA) with origins in the region. The reflections from these scientists regarding the level of regional collaboration indicated that this is clearly sub-optimal, suggesting the need to take immediate action.

Many of us were engaged in extensive discussions focusing on the promotion of regional and international cooperation in the field of X-ray crystallography and

*“Through this letter, we request the IUCr and UNESCO to initiate actions to **promote regional scientific collaboration** including the holding of training workshops, encouraging the **mobility of researchers** within the region, promoting **joint research projects**, leveraging national bodies and institutions for financial support and facilitating **regional conferences** on the subject of X-ray crystallography and its applications in Latin America. We also request the IUCr to facilitate the establishment of a **Latin American IYCr Cooperation Fund.**”*



Prof. Marvin Hackert, President, International Union of Crystallography  
Prof. Lidia Brito, Regional Director, UNESCO

Dear Colleagues

24<sup>th</sup> September 2014

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Many of us were engaged in extensive discussions focusing on the promotion of regional and international cooperation in the field of X-ray crystallography and complementary methods, in line with the objectives of the International Year of Crystallography. These discussions were consistent with recent efforts leading to the founding of the Latin American Crystallographic Association (LACA). The venue, being the home of the first synchrotron light source in the southern hemisphere, was fitting, and served also to highlight the ambitions of the region in constructing one of the world's most sophisticated, 4th generation light source, Sirius, before the end of the decade.

Through this letter, we request the IUCr and UNESCO to initiate actions to promote regional scientific collaboration including the holding of training workshops, encouraging the mobility of researchers within the region, promoting joint research projects, leveraging national bodies and institutions for financial support and facilitating regional conferences on the subject of X-ray crystallography and its applications in Latin America.

We also request the IUCr to facilitate the establishment of a "Latin American IUCr Cooperation Fund". We, as a community representative of our region, commit to persuade our academies, funding agencies and/or governments to provide annual contributions which are commensurate with each country's economic reality. Our aim is to raise US \$100K per annum for this fund. We request IUCr to provide encouragement by making an initial commitment of US \$20K per annum for 3 years. We request IUCr/UNESCO to manage these funds.

The funds will be used for a variety of actions including:

1. increasing collaboration and cooperation among scientists of the region,
2. providing seed money for up to 2 projects per annum involving a minimum of 2 countries in the region, at least one of which should be well established in crystallography
3. funding for short term visits (up to 3 months), primarily aimed towards an Early Career Researcher,
4. training workshops at centres of excellence or emerging centres in the region,
5. enabling the sharing of facilities within the region.

Signed by all those present from the region

NAME	position	Institution	Country
HAROLD BAEZ	Profesor	Universidad de Chile	Chile
DANIEL GUSMAN	Profesor	Universidad Peruana Cayetano Heredia	Peru
Ricardo Colera	Profesor	Universidad de Chile	Chile
SEBASTIAN KAMIC	Researcher	Instituto Leloir	Argentina
Alexei Garcia	Scientist	Brookhaven Natl Lab	USA
M. COSTAZZA	Profesor	Univ. Ude. del Sur	Argentina
A. MEDRALI	POSTDOC	INSTITUT PASTEUR	URUGUAY
Claudio Silva	Professor	Universidade Federal de Goiás	Brazil
João Paulo	Phd student	Universidade de Brasília	Brazil
Juliano BCG	Professora	Universidade F. do Espírito Santo	Brazil
BRUNA CAMPOS	POS DOC	LA/Bio	Brazil
João BARBOSA	PROFESSOR	UNIVERSIDADE DE BRASÍLIA	Brazil
Primo Rêgo	Professor	Universidade Fed. Ceará	Brazil
Primo Wilton	Professor	Universidade Fed. de Paraíba	Brazil

67 signatories follow



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Africa Initiatives

# summit meetings

**Bloemfontein (South Africa), 15-17 October 2014**

**Crystallography as vehicle to promote Science in Africa and beyond**



Venue: Dept. of Chemistry, University of the Free State, Bloemfontein, South Africa

Dates: 15-17 October 2014

*Jointly organized by:*



University of the Free State, Bloemfontein, South Africa



South African Government's Department of Science and Technology (DST)



European Crystallographic Association

9 Sessions

Young scientists flash presentations

3 Poster sessions

2 Panel discussions

*Current state of Crystallography/Science in Africa*

*Way forward for crystallography/ Science in Africa*

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Africa Initiatives

# summit meetings

Bloemfontein (South Africa), 15-17 October 2014

Crystallography as vehicle to promote Science in Africa and beyond



*It provided the opportunity to consider, discuss and review the status of education and research on the broadly defined discipline of Crystallography in countries in the region.*

- 100 senior researchers, early career researchers post-doctoral fellows and students
- 40 research groups
- 32 universities
- 22 countries





# Pan African and South African Summit of the International Year of Crystallography: IYCr2014Africa

Bloemfontein, South Africa, 15-17 October 2014



**The President: International Union of Crystallography**  
**The Director of the Science Policy and Capacity Building Division: UNESCO**  
**The President: European Crystallographic Association**  
**The Commissioner of Human Resources, Science and Technology: Africa Union**  
**All African Government Ministries of Science and Technology, Higher Education, Scientific research and Education**

In celebration of 2014 as the International Year of Crystallography (IYCr) as declared by the United Nations General Assembly (UNGA; resolution A/RES/66/28), the International Union of Crystallography (IUCr) and UNESCO are leading the year-long activities.

With this document we are pleased to briefly report on the successful 'Pan African Summit of the International Year of Crystallography 2014' (IYCr2014Africa) in Bloemfontein, South Africa, 15-17 October 2014. It provided the opportunity to consider, discuss and review the status of education and research on the broadly defined discipline of Crystallography in countries in the region.

The conference and summit meeting was attended by more than 100 senior researchers, early career researchers, post-doctoral fellows and students representing more than 40 research groups from 32 universities and more than 20 countries, primarily from Africa and Europe, and included decision makers. The delegates were in agreement that there is clearly a sub-optimal level of regional collaboration which requires immediate action. It is our view that supporting the broad discipline of Crystallography will significantly contribute to promoting science in general.

We therefore request through this letter that the IUCr and UNESCO, supported by the European Crystallographic Association (ECA), but also in particular governments of African Countries and via the African Union and the International Council for Scientific Unions (ICSU), all initiate and support further actions to promote regional scientific collaboration. These include, but are not limited to, the following:

- pro-actively continue with programmes to ensure that the legacy of the International Year of Crystallography and particularly the promotion of science is preserved;
- over time provide basic diffraction equipment for crystallographers in all countries in the region to allow research activity in Crystallography and balanced partnership collaboration across Africa and beyond;
- facilitate the establishment of National Committees of Crystallography in African Countries and support the activities of the existing ones;
- introduce a scientific visa to ensure mobility of researchers between African nations. Such a visa would allow for the exchange and collaboration between African countries and the sharing of scientific resources and expertise, to address common developmental targets, for the benefit of all.

This scientific visa should be free of charge, be valid for at least a year, and should be issued quickly once certified by appropriate higher education and research bodies;

- support training workshops;
- encourage the mobility of researchers within the region;
- promote joint research projects;
- leverage national bodies, institutions and international funding agencies for financial support;
- facilitate regional conferences on the subject of Crystallography and its applications in Africa;
- assist in the promotion of Crystallography and science in education programmes;
- provide the very poor countries with minimal infra structure and materials for research such as powerful computers for data analyses and servers,
- assist in creating a database, listing African crystallographers;
- establish a public awareness and engagement programme that will create fact-based understanding of Crystallography through awareness, dialogue and education in the region.

We further request that the IUCr and UNESCO facilitate the establishment of an African IYCr Cooperation Fund. As a community, we commit to engaging our local academies, funding agencies and/or governments to provide annual contributions commensurate with each country's economic status. The aim is to raise 80 000 to 100 000 Euro per annum for this fund. We request the IUCr to commit to seed-funding of US\$ 20 000 per annum for a three-year period. We further request the IUCr to manage these funds, or any local institution (such as AICA, once established) nominated by the IUCr.

The funds will support actions such as:

- increasing collaboration and cooperation among scientists in Africa;
- providing seed money for up to two projects per annum initially, involving a minimum of 2 countries in the region, of which at least one should be well established in Crystallography;
- funding for short term visits of up to 3 months for early career researchers;
- supporting training workshops at established centres of Crystallography or at emerging centres in the region;
- enabling the sharing of facilities within the region.

We envisage the formation of an African Crystallographic Association (AICA) to support and expand upon the actions above. A steering committee for this has been established at IYCr2014Africa in Bloemfontein.

These actions will enable Crystallography to be used in the promotion of science in the region and reiterate the need for immediate and well defined action.

Signed by those present,

73 signatories follow





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Africa Initiatives

# summit meetings

Bloemfontein (South Africa), 15-17 October 2014

## Appeal



- ✓ legacy of the International Year of Crystallography;
- ✓ provide basic diffraction equipment;
- ✓ establishment of National Committees of Crystallography;
- ✓ **scientific visa**;
- ✓ training workshops, education programmes, mobility of researchers, joint research projects, regional conferences;
- ✓ Formation of the **African Crystallographic Association** (AfCA).

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Africa Initiatives

# summit meetings

**Bloemfontein (South Africa), 15-17 October 2014**

## Appeal

We further request that the IUCr and UNESCO facilitate the establishment of an African IYCr Cooperation Fund. **The funds will support actions such as:**

- **increasing collaboration and cooperation** among scientists in Africa;
- providing seed money for up to two projects per annum initially, involving a minimum of 2 countries in the region, of which at least one should be well established in Crystallography;
- funding for **short term visits** of up to 3 months for early career researchers;
- supporting training **workshops** at established centres of Crystallography or at emerging centres in the region;
- enabling the **sharing of facilities** within the region.

We further request the IUCr to manage these funds, or any local institution (such as AfCA, once established) nominated by the IUCr.

**We envisage the formation of an African Crystallographic Association (AfCA) to support and expand upon the actions above.** A steering committee for this has been established at IYCr2014Africa in Bloemfontein.

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ICSU

International Council for Science

## ICSU Grants Programme 2015

Project title: *Building Science Capacity in Africa via Crystallography*

Lead Applicant: IUCr



Co-Applicant: ECA



Proposers: *Michele Zema* (IUCr), *Andreas Roodt* (ECA)

Supporting organizations: ECA, UNESCO, SAASTA, ICSU ROA, INDABA

### Project plan (2015/2016):

1. *Follow-up meeting to the Bloemfontein Summit (to be held in **North Africa**)*
2. *Crystallography **workshop in Central Africa** (preferably, DR Congo)*
3. *Support to African scientists to attend the **INDABA** series of conferences in South Africa*

+ many additional actions



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IYCr Legacy

what's next

# The IYCr legacy

- ✓ *Building capacity / on-going training*
- ✓ *Set up the IYCr legacy fund*
- ✓ *Develop sustainable programmes in Africa, Asia and South America in collaboration with UNESCO and other international organization (e.g., TWAS, ICSU)*
- ✓ *Transition of other IYCr activities to sustainable long-term IUCr initiatives in collaboration with the national and regional associates*
- ✓ *Sustain the formation and development of new regional (LACA, AfCA) and national associations*
- ✓ *Create joint programs with large-scale facilities for students from the developing countries*
- ✓ *Integrate IYCr web site resources into a re-designed IUCr web site*

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Acknowledgements

# Acknowledgements

- ✓ Organizers: Abdelmalek Thalal, Claude Lecomte, Michele Zema
- ✓ *UNESCO / ICSU ROA / TWAS*
- ✓ Moroccan Crystallographic Association (UN delegation)
- ✓ Academie Hassan II des Science & Techniques
- ✓ *Industrial partners*
- ✓ *Chester Staff (**Michele Zema** – Project Manager for IYCr2014)*
- ✓ *Regional Associates*

# IYCr2014 Supporters

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# IYCr2014 Supporters: large-scale facilities



Elettra Sincrotrone Trieste



KIT  
Karlsruhe Institute of Technology



LNLS  
Laboratório Nacional de Luz Síncrotron



EUROPEAN  
SPALLATION  
SOURCE



Siam Photon



SACLA



MAXIV  
LABORATORY



DESY



Canadian Centre for  
Light Synchrotron



RIKEN



TU Delft  
Delft University of  
Technology



Argonne  
NATIONAL  
LABORATORY



NSRRC



PAUL SCHERRER INSTITUT  
PSI



REACTOR  
INSTITUTE  
DELFT



SSRF  
Shanghai Synchrotron  
Radiation Facility



SESAME



ESRF



SPring-8



ILL  
NEUTRONS  
FOR SCIENCE



SOLEIL  
SYNCHROTRON