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Year 2015- International Year of Light:

An opportunity to know the importance of Science & Scientist for shaping the society

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Abstract- International Year of Light (**IYL**) 2015, proclaimed by United Nations is a global initiative adopted by the United Nations to raise awareness of how Light & Optical technologies and Basic sciences promote sustainable development and provide solutions to worldwide challenges in energy, education, agriculture, communications, health and for developing scientific temper. In last 10 years, we have conducted various academic activities and found attention of students and encouraged them to ask relevant new finding in science, research and technology. Such efforts have also helped in demystifying scientific research and developing scientific thinking in Young minds.

Index term- IYL-2015, Scientific Culture, Well developed system of higher education.

I. INTRODUCTION

On 20th December 2013 in 71st plenary meeting of 68th session of the UN general assembly, **Year- 2015** was proclaimed as the **International Year of Light (IYL-2015) and Light based technology just as years 2005, 2009 and 2011 were celebrated as International year of Physics, International year of Astronomy and International year of Chemistry respectively**. IYL-2015 partnership formed in 2010, is a cross-disciplinary educational and outreach project involving more than 85 countries, accompanied by the UNESCO international Basic Science Education activities. A resolution was adopted by the UNESCO executive board in Paris from 3-18 October 2012 welcoming and endorsing an International Year of Light in 2015. UNESCO formally submitted the resolution to the UN on 6th November 2013 [1,2]. This resolution includes**:** Science and Technology for development of society, application of light as vital for existing and future advances in medicine, energy, information technology, Astronomy, Agriculture, archeology and other aspects. UNESCO has declared the 21st century as the century of light (the 20th century was declared the century of Electronics). Such events proclaimed by the United Nations promote and spread awareness of fundamental science and cutting edge research such as Nanotechnology, Cognitive science, String theory, Stem cell research, Biotechnology etc. for establishing the image of Science & Scientists, their contributions, need and importance for society. The Physical review letters also celebrated IYL-2015 and collected several papers related to light that was free for reading through the year 2015[3].

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II. IYL- Commemorates a series of milestones

1. Early work on optics by the medieval Arab scholar Ibn Al-Haytham in 1015.

2. The notion of light as a wave proposed by Fresnel in 1815.

3. The electromagnetic theory of light propagation proposed by Maxwell in 1865.

4. Einstein's embedding of light in cosmology through General theory of relativity in 2015.

5. The discovery of cosmic microwave background by Penzias and Wilson in 1965.

6. Charles K. Kao's achievements in 1965 concerning the transmission of light in fibers for optical communication.

III. WHY LIGHT IS CONSIDERED SO IMPORTANT

A. Light is important due to its following aspects

Light connecting the global society, Active vision power, work done during day, development in Astronomy, communication accessibility, biomedical imaging, clinical treatment, photosynthesis in Agriculture, natural light and brightness of planet earth, Drying cloths, killing of bacteria and generation of free radicals, Art, culture & humanity, visibility of currency notes, Laser light and its uses in medical science & Engineering science, Wave as well as particle nature of Light, Light in mobile phone, Light emitting materials and their applications for technological advancement etc.

B. Goal of International Year of Light

1. Improve public understanding how light and light based technologies touch the daily lives of everybody, and are central to future development.
2. Build worldwide educational capacity through activities targeted on science for young people.
3. Promote the importance of light based technologies in sustainable development.
4. Promote awareness of the interdisciplinary nature of 21st century Science.
5. Intimate link between light and Art, enhancing the increasing role of optical technology in the preservation of cultural heritage.
6. International cooperation by coordinating activities between learner societies, educational establishments and industry focusing on new partnership and initiatives in the development of world.
7. Establish durable partnerships to ensure that these activities, goals and achievements continue in the future.

C. Nobel Prize in Physics 2014: Bright revolution in Light

The Nobel prizes in Physics 2014 was awarded jointly to Isamu Akasaki, Hiroshi Amano and Shuji Nakamura for the invention of efficient blue-emitting diodes which has enabled manufacture of bright and energy-saving white light sources. Now more efficient, cheaper and smarter lamps are now being built using LED. All this was made possible only by the tireless and sincere efforts of a band of dedicated scientists including Akasaki, Amano and Nakamura.

D. Photonics and Nanotechnology: Importance of light and light based Technologies

1. Entire internet communication system is based on optical technology and all the heavy lifting of the internet is through optical fibers buried in the ground and under the oceans.

2. If water leaks from cylindrical shape pipes, photonics can help detect such leakages and thus help both conservation and reliable supply.

3. In the Defence sector, target designators, range finders or weapons all work with phonics and its characteristics.

4. Photonics also has important role to play in high energy Physics, energy generation and nuclear fusion.

5. There are optical fibers on the International space station, there are fibers on Mars, there are fibers on moon, all doing sensing applications. The latest moon rovers and Mars rovers are firing Lasers on the rocks and examining the plumes for analyzing what it is made of.

6. The present century is expected to see big advancement in photonics for communication and computers. There will be massive Lasers for medical treatment, cutting and welding, creating the conditions at the beginning of the universe can only be done through Laser spectroscopy.

7. Optical properties of **nanomaterials** are being used in following area: Biological imaging, Nano medicine & Biotechnology, cell tracking, Chemo-sensoring, Bio-separation, Light emitting devices, drug delivery and therapy, Organic fluorescent dyes, MRI detection etc.

E. Importance of Light, basic sciences & research in everyday life : Strategies and future direction

In order to sustain and to strengthen its mental and economical growth, the society needs robust development in the areas of science, education & research, ethics and higher education. As it has been stated in Bhagwad geeta, the society achieves its pinnacle not through mechanical and technological forces but through moral and ethical values. Such plans can be fruitful, only when we revive the past and present contributions of science education, research and scientists. The developments in the field of science education and research are routed through basic sciences and interdisciplinary research. The Government of India has launched its new education policy in this regard – **Educate, Encourage, and Enlighten** – on the republic day (26th January 2015) this year [4]. Young minds should realize who really are the nation builders?

Is science education a global business? Can we establish socio-economic harmony using the learning of science through innovative methods, Science & Technology popularizations, organizing conferences/workshops/seminars research driven learning and inspire sessions that foster moral and ethical values along with a scientific outlook. In the last 10 years we have visited various academic institutions of India and felt that a majority of young minds are infatuated with money power, political power, muscles power, Big cars, Big packages and Recognitions rather than for creating knowledge and understanding and doing new innovations. Such campaigning has inspired us to write various articles for revitalization of experiment assisted teaching, research and innovations and nurturing ethics among young minds [5-8]. If young people or best brains choose a career in science and technology, then social recognition must be given for their efforts.

Therefore in this auspicious year - 2015, several areas of light such as Photonics, magnetic-photoluminiscent materials, liquid crystals, solar rays, basic optics and basic science can be presented in specific ways so that scientific text together with associated authors/persons contributions could be appreciated at a large scale. We have also done some work in these areas [9-18].This way a value based society can be developed with the help of science education, scientific outlook, scientific temper, moral and ethical values could be developed which are the basis of modern development of a value based society.

Therefore, we salute the scientists- Haytham, Fresnel, Maxwell, Einstein, Penzias and Wilson, Charles and others for their contributions and we should plan to create conducive atmosphere of learning, concept oriented teaching, Research and more importantly, an atmosphere that fosters moral and ethical values.

We should realize that no society can become a superpower without the aid of dedicated scientists and without a well-developed system of higher education.

The messages should go to rural areas as well as to capitals of all states and nations regarding who really are the real heroes of nation building. Awareness programs for rejuvenation and popularization of basic science and front line research such as Nanotechnology, Cognitive science, Stem cell research etc. are essential for creating a positive outlook towards science and technology in the present modern society. Students and faculty members of non accredited institutions can also perform well if they are promoted and encouraged. Concept learners with good moral and ethical values always do better in life and are the real assets of their society. They should be sought for and given important responsibilities. Therefo**r**e we should not only aim for creating awareness towards basic and applied sciences through research cum innovation programs, but also promote ethics, moral values, love for society and scientific temper in the young minds.

IV. The following things can be considered as important for a value based science as well as research cum technological advancement oriented society

1. Creation of a conducive atmosphere for scientific research, innovation and inventions and giving them proper recognition.
2. Fundamental science as well as Technological innovations are essential for National advancements.
3. Good research in emerging and converging technologies, such as Nanotechnology, Biotechnology, Cognitive sciences, Microelectronics, Environmental Engineering, Stem cell research etc. is dependent on a good grasp of Basic Sciences. Therefore we should give special focus for growth of quality education in basic sciences.
4. Innovative methods of teaching, especially interesting class room teaching methods should not be devoid of discipline. Small classroom demonstrations are one of the best methods for making classroom teaching interesting. We are involved in promoting such activities and by attracting the attention of students, we encouraged them to ask relevant questions in science. Such efforts have also helped in demystifying science and developing scientific thinking in students/faculty members [7,13,14].
5. Creating ethics among teachers, students, scientists.
6. MBTI(Myers Briggs Type Indicator) results help in creating a conducive academic atmosphere in any system.
7. The well known academician Prof. Yash Pal has said that "In atomic energy, space science, CSIR laboratories, maximum employees are from general engineering colleges, universities which are not accredited of national or international repute" [19]. Therefore students and faculty members of nonaccredited institutions should also be promoted and they can perform well, if opportunities given them.
8. The scientific method is applicable not only for the individual, but also for teamwork and sharing knowledge. Therefore collaborative research should be promoted.
9. INSPIRE lecture series should be organized regularly. The article titled" Role model ne badaldiya jeevan ki disha" stated by Infosys Chairman - Narayan Murti. In 1968, on a Sunday morning at IIT Kanpur, Murti interacted with computer science engineers of America and learned many new things. After that he immediately read few books of computer science and choose a career in computer science [20]. Similar INSPIRE programme, started by DST-Govt. of India is also found encouraging.
10. Big salary packages allure the best minds for working in companies/industry rather than for scientific research. There should be a plan so that the best brains may contribute in research areas and special recognitions as such should be awarded by the society. Indian Science must face new challenges squarely, Young scientists must face new challenges squarely and leadership in science education should also face the new challenges squarely. Such initiatives enjoy the fun of creating new ideas and destroying obsolete dogmas.

V. Conclusion: Special sessions/courses for uplifting Scientific temper, moral & ethical values, healthy mind & healthy body should be held not only for the young minds but also all for all concerned so that sustainable plan can be strengthen that facilitates sharing of global best innovative practices. Science and Technology, Cutting edge research popularization encourage to society to establish the image of science & scientists and well developed system of higher education.

Note: Ideas/text in this articles are author's own opinion/observations.

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Authors Brief

Dr. Rakesh Kumar Singh (37 year) born at kasamra Village under Dhamdaha block of Purnea district of state Bihar, India. At present he is an **Assistant Professor cum Professor incharge-Establishment,** in the University Centre for Nanoscience & Nanotechnology of Aryabhatta Knowledge University, Patna. He has also worked as an assistant Professor of Physics in prestigious College with Potential for Excellence(**CPE) status**, accorded by UGC & NAAC- '**A' Grade** Institute-**Patna Women's College, Patna University** from August 2004 to 1st Sep. 2013. Dr. Rakesh did his Ph. D and Post-Doctoral work in Magnetic nanomaterials and presently working on **Magnetic nanomaterials, Ayurveda Bhasama &Nanomedicine, Functional nanomaterials in food, Research Inspired learning through experiment**. Aapart from teaching-learning & evaluation and co-curricular activities, he has guided, UGC-Sponsored research projects under **'College with Potential for Excellence' (CPE) status** scheme, and **Basic Scientific Research (BSR), UGC- Govt. of India**, special scheme (**total projects: CPE : 09 and BSR : 07 = 16) and supervised about 50 young science students of age group 17-25 years.** He has been the organizing secretary/ Conveners/ Coordinators of more than 50 conferences/ seminars of international/ national repute. Dr. Rakesh Kr Singh published more **than 62 research publications**/ books/ chapter in a book on teaching, Nanomaterial Research and popularization in international/ national journals/ proceeding etc. To his credit, he has received many recognitions/awards. He is closely associated to several scientific bodies, such as-Indian Association of Physics Teachers, Anveshika, Senior resource person of Utsahi Physics teachers group (utsahiphysicsteachers.com), Society for Scientific Values, Delhi and others. **He was a Master Resource Person of World Year of Physics-2005 and International Year of Astronomy-2009, Proclaimed by United Nation**. ***Email-rakeshsinghpu@gmail.com***

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