

REVISED itinerary and detailed program for the visit to Jain University by the delegation  
from Ohio State University

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3-Members delegation from the Ohio State University will visit Jain University on January 29,30 and 31.

Members: (1) Dr. Anil Pradhan  
(2) Dr. Sultana Nahar  
(3) Dr. Ratnesh Bhattacharya

*Dr. Anil Pradhan and Dr. Sultana Nahar have made stellar contributions in atomic physics, astrophysics, radiation science, medical physics.*

*Internet links for the works of Dr. Anil Pradhan and Dr. Sultana Nahar:*

*Homepage: <http://www.astronomy.ohio-state.edu/~pradhan>*

*TEXTBOOK: "Atomic Astrophysics and Spectroscopy",*

*Anil Pradhan and Sultana Nahar*

*(Cambridge University Press 2011):*

*<http://www.astronomy.ohio-state.edu/~pradhan/Book/book.html>*

*Dr. Ratnesh Bhattacharya is the Director, OSU Global Gateway India Global Gateways Initiative, Office of International Affairs, Ohio State University.*

The proposed itinerary for the visit of OSU delegation's visit is as follows:

Jan.29, Wednesday:

Arrival by Jet Airways 9W 2817 from Delhi  
Arriving at 16:50.  
All the three members will be arriving by the same flight.

JU representatives will receive the OSU delegation at the Bangalore airport and take the visitors to their hotel (Taj Vivanta).

7pm: Prof. NVH Krishnan (Registrar, Jain University) will meet the delegation at their Hotel and host dinner for them.

Jan.30, Thursday:

JU Car will pick up the members of the OSU delegation and bring them to the GLOBAL CAMPUS. Another car will pick up 8 members of the faculty from CPGS and bring them to the GLOBAL CAMPUS. **NOTE: Pick up time: 8:30am, sharp!** All participants are requested to be ready for departure few minutes prior to departure. It is a long drive (60 to 90 minutes, depending on the world-famous Bengaluru traffic!)

The following participants from CPGS will be picked up from CPGS and taken to the Global Campus:

- 1) Dr. Sudha Deshmukh
- 2) Dr. K.N.Varalakshmi
- 3) Dr. O.S.Bindu
- 4) Dr. Swati Routh
- 5) Dr. N. Shanthi
- 6) Dr. Sovan Ghosh
- 7) Dr. Parijatha Rao
- 8) Dr. Sri Vidya
- 9) Dr. P.C.Deshmukh

Events at the Global Campus:

**10am to noon: Visit coordinated by Dr.Krishna Venkatesh, Dean-Research, JU.**

**Noon to 1pm: Talk by Dr. Sultana Nahar**

Title: Hot Atoms and Spectroscopy of Astronomical Objects

Abstract: We study astronomical objects through the radiation they emit.

The radiation can be generated at the core due to nuclear fusion.

However, most radiation we observe come from excited atoms and ions

- "hot atoms". Ground telescopes and space observatories detect the radiation or the photons. Through spectral analysis of these photons we learn about these objects. I will discuss some illustrative astronomical objects and what are the dominant processes of these "hot atoms" that cause emission or absorption of radiation.

1pm to 2pm: Lunch at Global Campus

2pm: Departure of the three OSU delegates, Dr. Sudha Deshmukh, Dr. P.C.Deshmukh to the Knowledge Campus. Dr. Krishna Venkatesh will also join, if possible.

Other faculty from CPGS will return to CPGS.

**3:30pm to 5pm (at Knowledge Campus): Discussions between OSU delegates and the President (Dr.Chenraj Roychand), VC (Dr.N.Sundararajan), PVC (Dr.Sandeep Shastri), Registrar (Prof.NVH Krishnan), Dean-Sciences (Dr.Sudha Deshmukh), Dean-Research (Dr.Krishna Venkatesh), Director-HR&CA (Ms.Aparna Prasad) and Dr.P.C.Deshmukh at the Knowledge Campus.**

**Thursday, January 30, 3:30pm to 5pm (at Knowledge Campus):**

**Discussions between OSU delegates and the President, VC, PVC, Registrar, Dean-Sciences, Dean-Research, and PCD at the Knowledge Campus.**

Agenda (PCD will conduct the proceedings of the meeting):

Goal of this meeting: Set the platform for OSU-JU collaboration in various areas of physical and life sciences toward a prospective MoU/MoA between the two universities.

- \* Dr. P.C.Deshmukh will speak for two minutes, welcoming the guests, and invite Dr. Chenraj Roychand (President, Jain University) to deliver WELCOME ADDRESS.
- \* Dr. Chenraj Roychand, President, JU, will deliver the WELCOME ADDRESS
- \* Dr. Sandeep Shastri, Pro Vice Chancellor, will make a presentation on the scope of Jain University's academic programs.
- \* Dr. Anil Pradhan will make a presentation of a Comprehensive plan about OSU initiatives in India and specifically about the OSU-JU prospective cooperation/collaboration.
- \* Dr. Ratnesh Bhattacharya will speak about OSU's International program, specifically in India.
- \* Dr. Sultana Nahar will make a mention of the some of the Immediate joint programs that will be taken up by OSU and JU Faculty.
- \* Dr. Sudha Deshmukh, Dean-Sciences (JU) and Director-CPGS will present an overview of the academic program at CPGS and highlight prospective areas of collaboration.
- \* Dr. Krishna Venkatesh, Dean-Research (JU) will share his vision of the OSU-JU initiatives.
- \* Mementos will be presented to the visiting delegation from OSU.
- \* Dr. N. Sundararajan, Vice Chancellor, JU, will conclude this meeting.

**Notes: After this meeting, Dr. Ratnesh Bhattacharya would leave. Dr. Anil Pradhan and Dr. Sultana Nahar will return to Hotel Taj Vivanta. Dr. Ratnesh Bhattacharya is not available on the next day due to prior commitments.**

### **January 31st, Friday:**

- 9:00am: Dr. Sultana Nahar and Dr. Anil Pradhan will be picked up at 8:30am from Hotel Taj Vivanta and taken to the Knowledge Campus.
- A separate van will pick up CPGS faculty (listed above) from CPGS and taken to the Global Campus.

9:30am to 10:30am: Talk by Dr. Anil Pradhan on Biomedical Physics at the Knowledge Campus

#### **Title of the talk: X-ray Irradiation of Heavy Element High-Z Nanoparticles for Cancer Theranostics**

Cancer is now the leading killer in many countries. In the U.S., one in two men and one in three women will contract some form of cancer during their lifetimes. While considerable incremental progress has been made in treatment, the overall mortality rates have not declined for several types of cancer. In emerging nations such as India, cancer is also fast becoming alarmingly common owing to improved detection and diagnostics. It is clear that novel pathways and treatments must be developed to counter cancer in the myriad forms that it manifests itself. We describe the use of heavy element high-Z (HZ) nanoparticles as radiosensitizing agents for cancer therapy and diagnostics (theranostics). Numerical Monte Carlo simulations demonstrate that low energy X-rays (LEX), <100 keV, should be more effective for killing HZ-sensitized cancer cells than the MeV high energy X-rays (HEX) from Linear accelerators (LINAC) used in conventional radiation therapy. We present experimental *in vitro* results on F98 rat glioma (brain cancer) cell lines sensitized with platinum based compounds, such as carboplatin, using broadband 160 KV and 6 MV LINAC X-ray sources. The general agreement found between theoretical and empirical data also suggests potential combination of chemotherapy and radiation therapy. Studies using gold nanoparticles (GNP) and other cancer cell lines are discussed. We also describe biomedical research devoted to the development of new devices for diagnostics and treatment.

#### References:

1. Pradhan, AK, Nahar, SN, Montenegro, M, et al. (2009) Resonant X-ray enhancement of the Auger effect in high-Z atoms, molecules, and nanoparticles: potential biomedical applications. *Journal of Physical Chemistry A* 113:12356-12363.
2. Montenegro, M, Nahar, SN, Pradhan, AK, et al. (2009) Monte Carlo simulations and atomic calculations for Auger processes in biomedical nanotheranostics. *Journal of Physical Chemistry A* 113:12364-12369.
3. S. Lim, M. Montenegro, A.K. Pradhan, S.N. Nahar, E. Chowdhury and Y. Yu, Broadband and Monochromatic X-ray Irradiation of Platinum: Monte Carlo Simulations for Dose Enhancement Factors and Resonant Theranostics. *World Congress on Medical Physics and Biomedical Engineering, IFMBE Proceedings* 39, 2248-2251 (2012).
4. Lim, S and Pradhan, AK (2013), Energy dependence of X-ray radiosensitization with high-Z elements in biological environments (Submitted).
5. Sara N. Lim, Anil K. Pradhan, Rolf F. Barth, Sultana N. Nahar, Robin J. Nakkula, Weilian Yang, Alycia M. Palmer, Claudia Turro, Erica Hlavin Bell, Xiaokui Mo, Tumoricidal Activity of Low Energy 160 KV X-rays versus 6 MV Photons Against Platinum Sensitized F98 Glioma Cells (Radiation Oncology, submitted).

**10:30am to noon: Discussions, formulation of academic collaboration strategic plan and developing the platform for academic MoU/MoA between JU and OSU.**

**Noon to 1pm: Lunch (OSU delegates, CPGS faculty, JU administrators)**

**\* The OSU delegated will depart for Indian Institute of Astrophysics and the CPGS faculty will return to CPGS.**