Catalysts for African Development and Advancement (CADA)

Omololu AKIN-OJO

EAIFR
ICTP—East African Institute for Fundamental Research
an ICTP Partner Institute

ICTP The Abdus Salam International Centre for Theoretical Physics

UNESCO

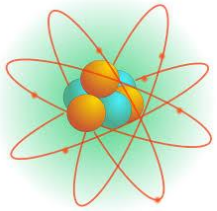
UNIVERSITY OF RWANDA

Republic of Rwanda

Ministry of Education

...Research and Discoveries for African Development and Advancement

Our Goal

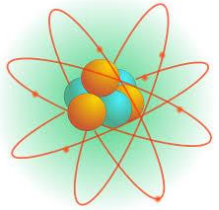


Research and Discoveries

for

African Development and Advancement

(RADADA)



*** Research and Discoveries (R&D) – Collab & Visits**

*** Training (for R&D) → MSc and PhD**

\+ Workshops/Short courses

*** Outreach → Via Students and Research Products**

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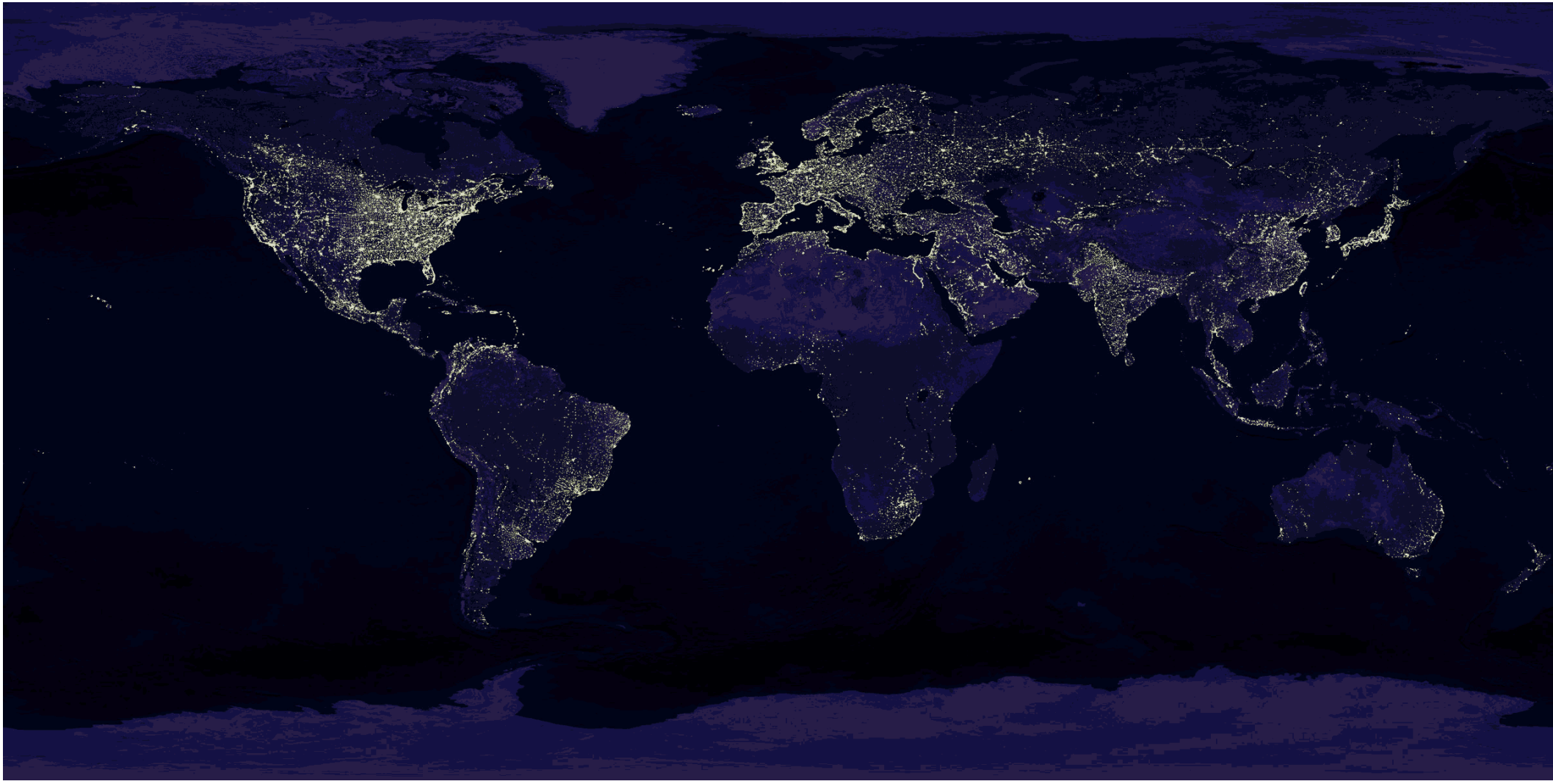
Dark Continent?



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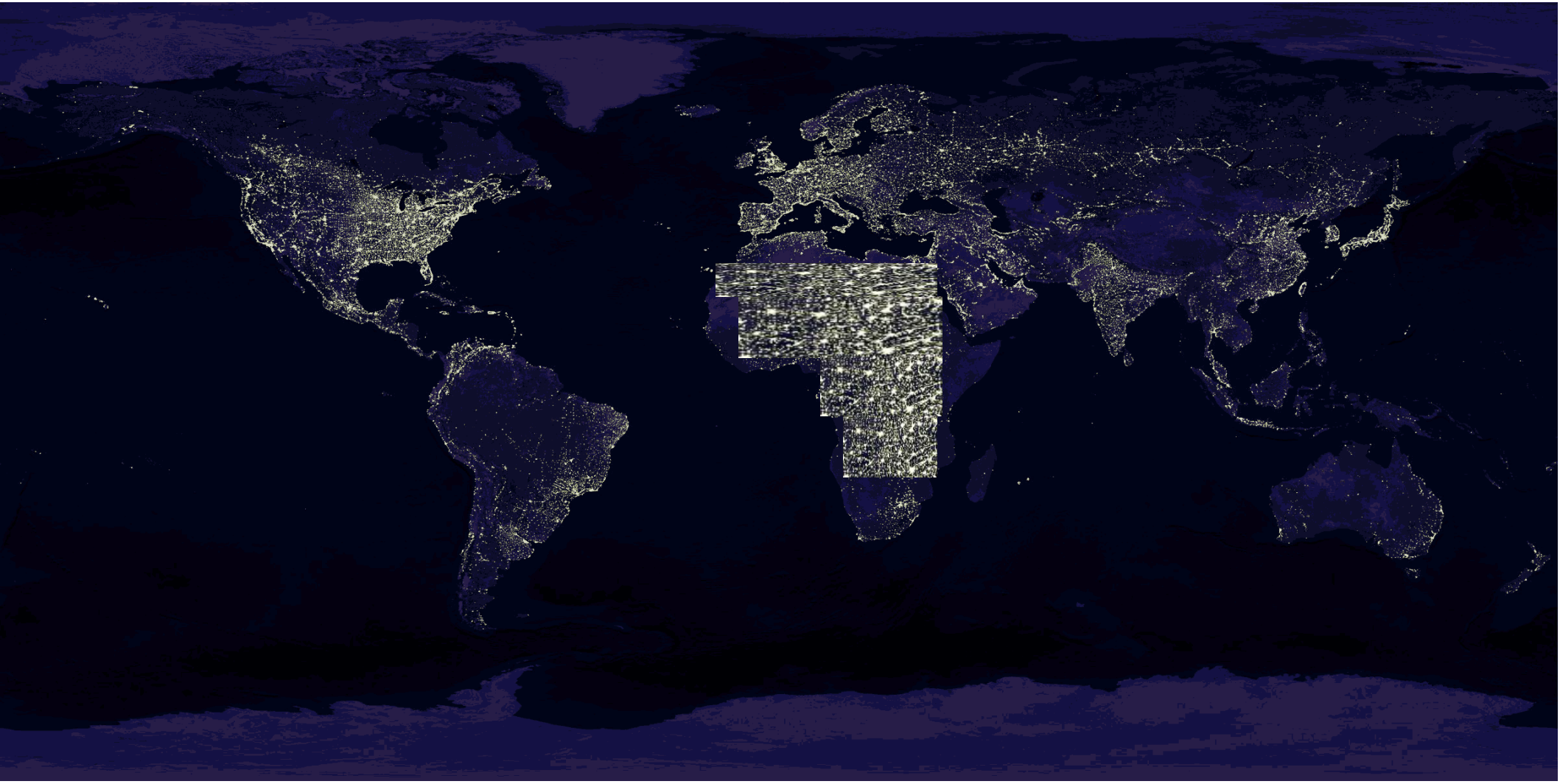
Near Future



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Clean Water

(Water Purification)

“40% of Africans (over 330 million people) do not have access to safe drinking water, and half of people living in rural areas lack access.”

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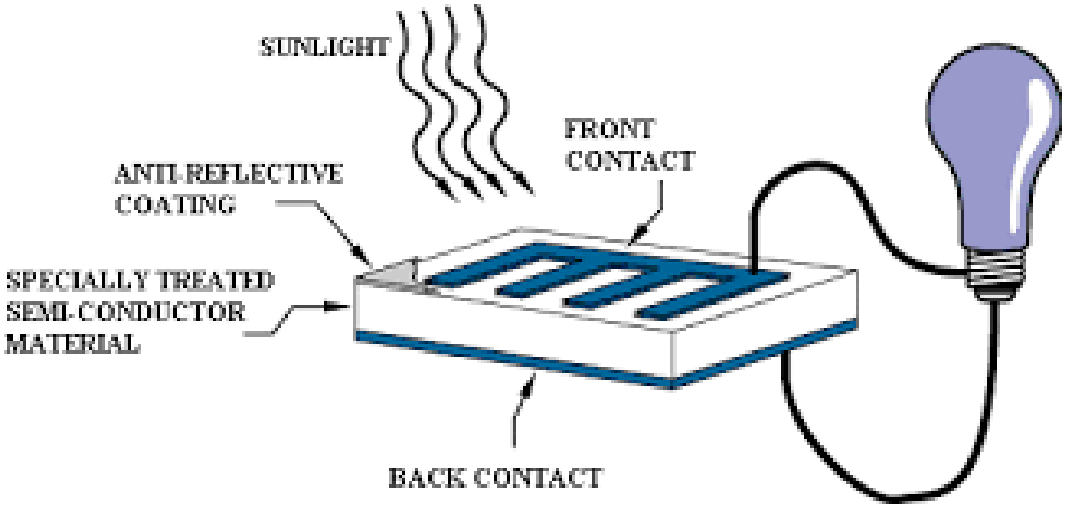
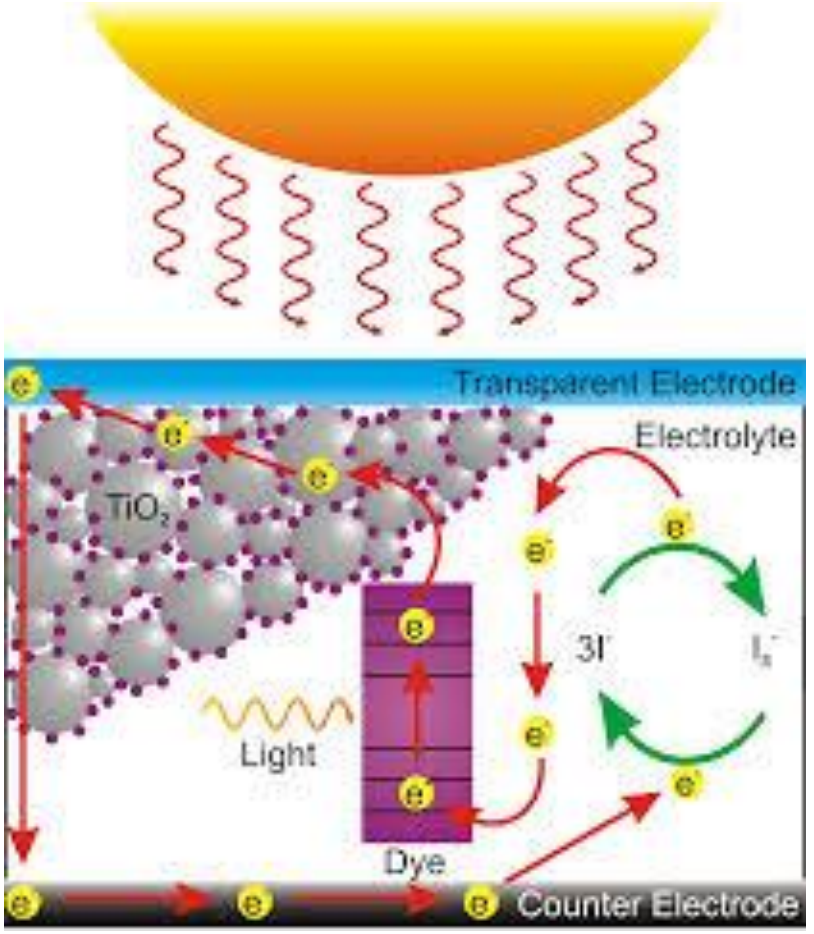
SOLUTIONS

1) Solar Cells – Develop Cheap & Efficient Solar Cells: Quantum Dot solar cells, DSSCs, Perovskite Solar Cells





2) Fuel Cells

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SOLAR CELLS IN THEORY AND PRACTICE

(SCITAP-2018-A)

25 June – 29 June, 2018

University of Rwanda, Kigali, Rwanda

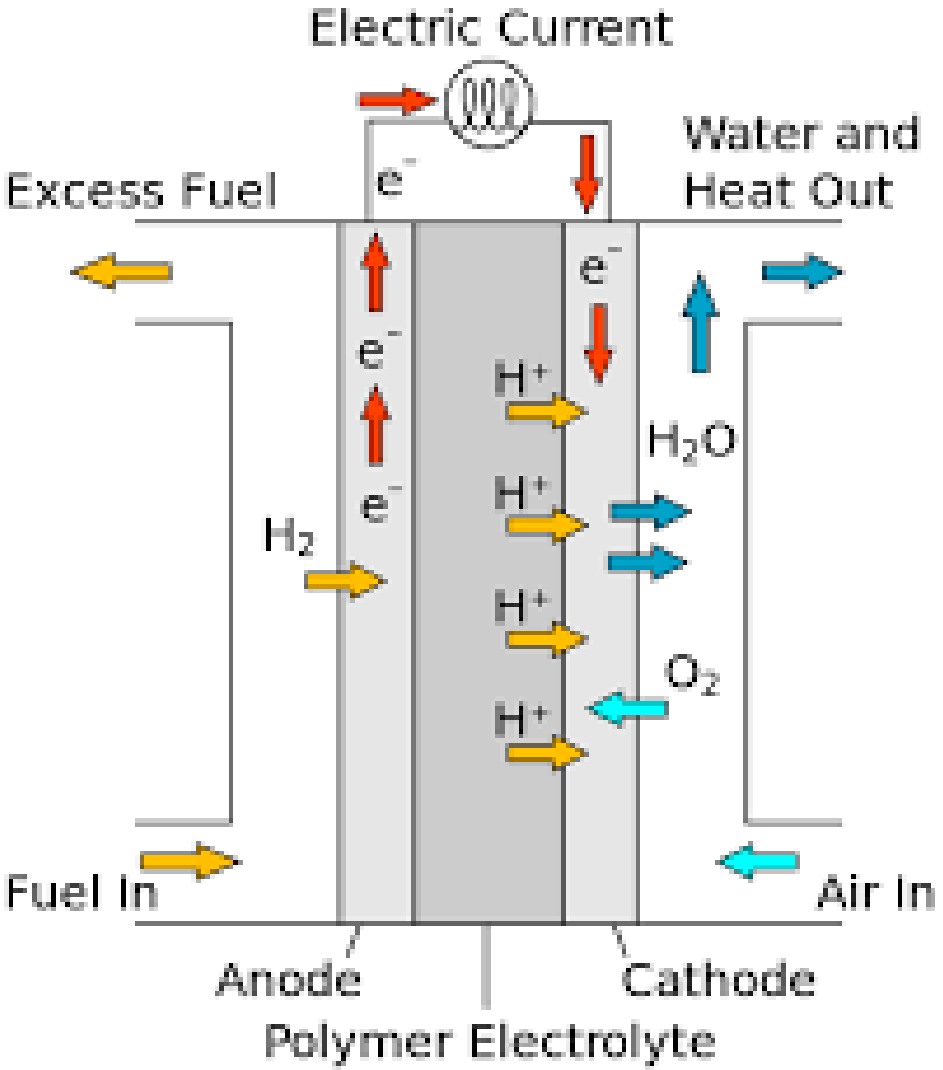
Background and purpose

A 5-day intensive mini school, organized by the ICTP East African Institute for Fundamental Research (EAIFR) will be held at the ICTP-EAIFR premises of the University of Rwanda, Kigali. The goal of the short school is to train scientists and engineers in solar cells research and practical applications, i.e., it aims to train participants in photovoltaic science and technology.

Topics covered

* Working Principles of Solar Cells
* Development of Dye Sensitized Solar cells (DSSCs): Theory and Hands on Session
* Device Simulation of Solar Cells
* Absorption Spectra of materials relevant to DSSCs
* Set up of Practical Solar Systems (Theory and Hands on):
    + Solar Irradiance
    + Solar Panel Choices and Positioning;
    + Connecting cells to make modules
    + Charge Controller
    + Battery Choices
    + Suitable Inverters

Fuel Cell



Design Cheap Catalysts!
Solve Water and Energy Problems!

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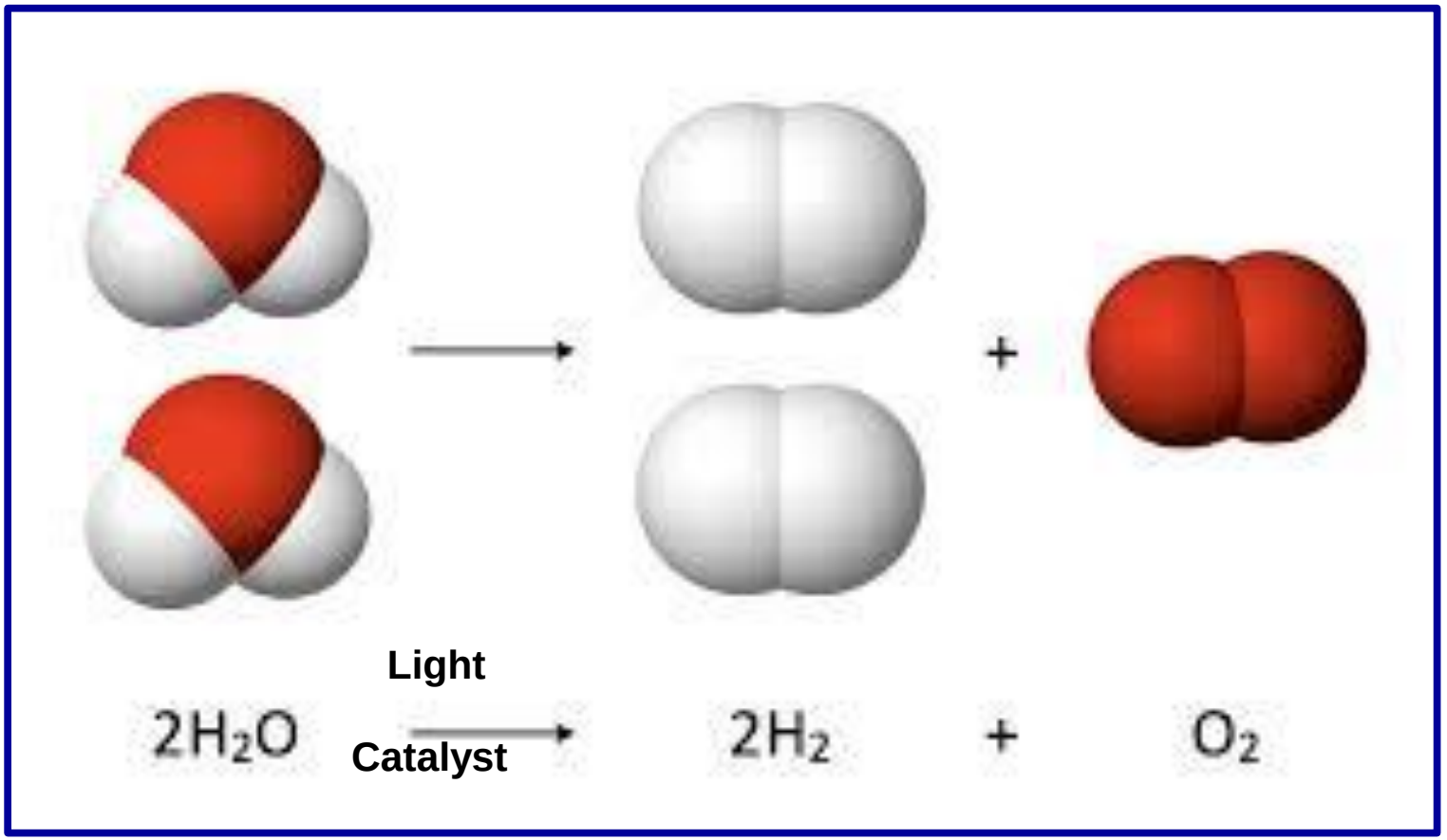
H_2 from Splitting Water



Design Cheap Catalysts!
Solve Water and Energy Problems!

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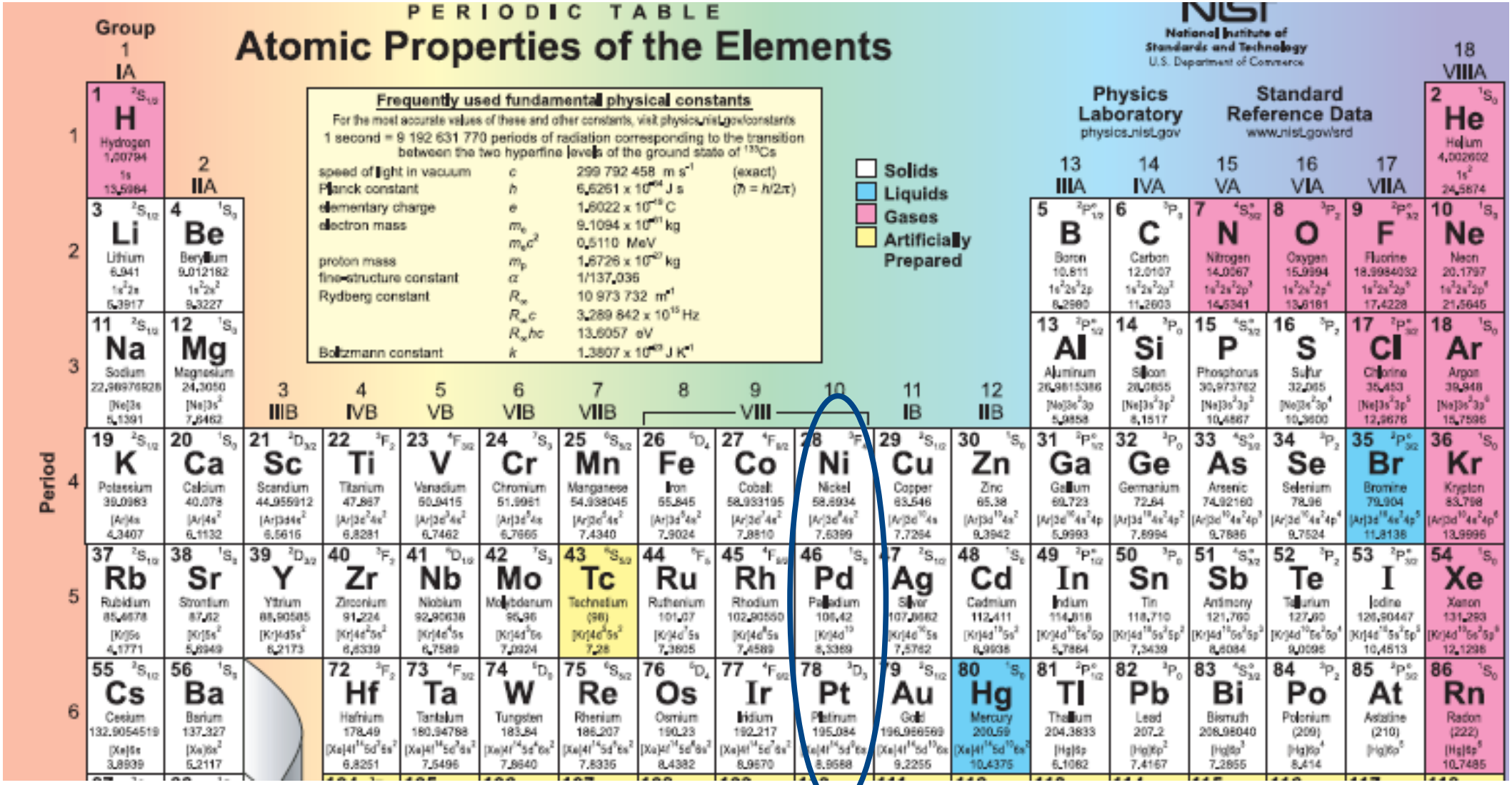
First: Understand How Platinum Works



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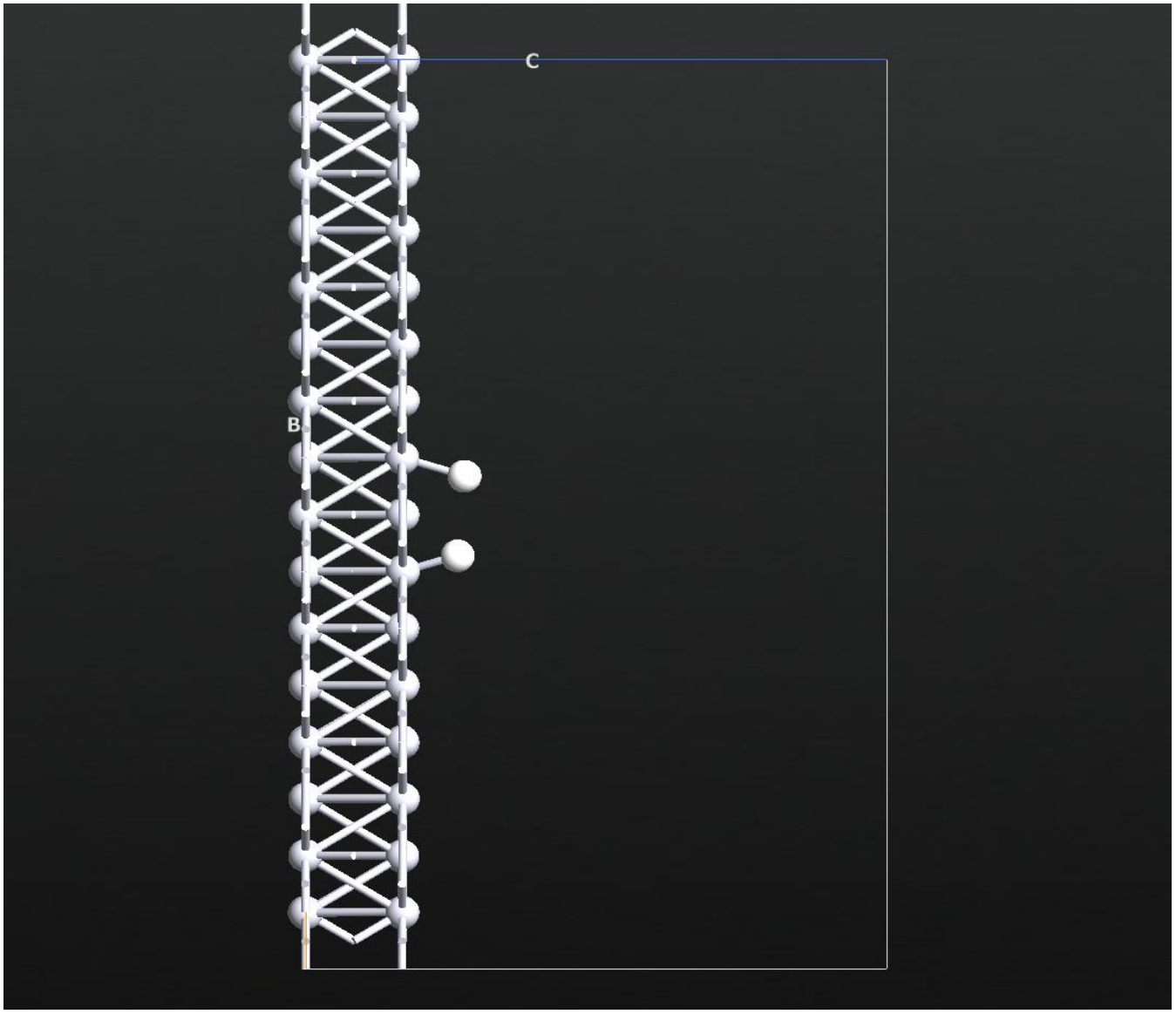
First: Understand How Platinum Works



H2 on PLATINUM

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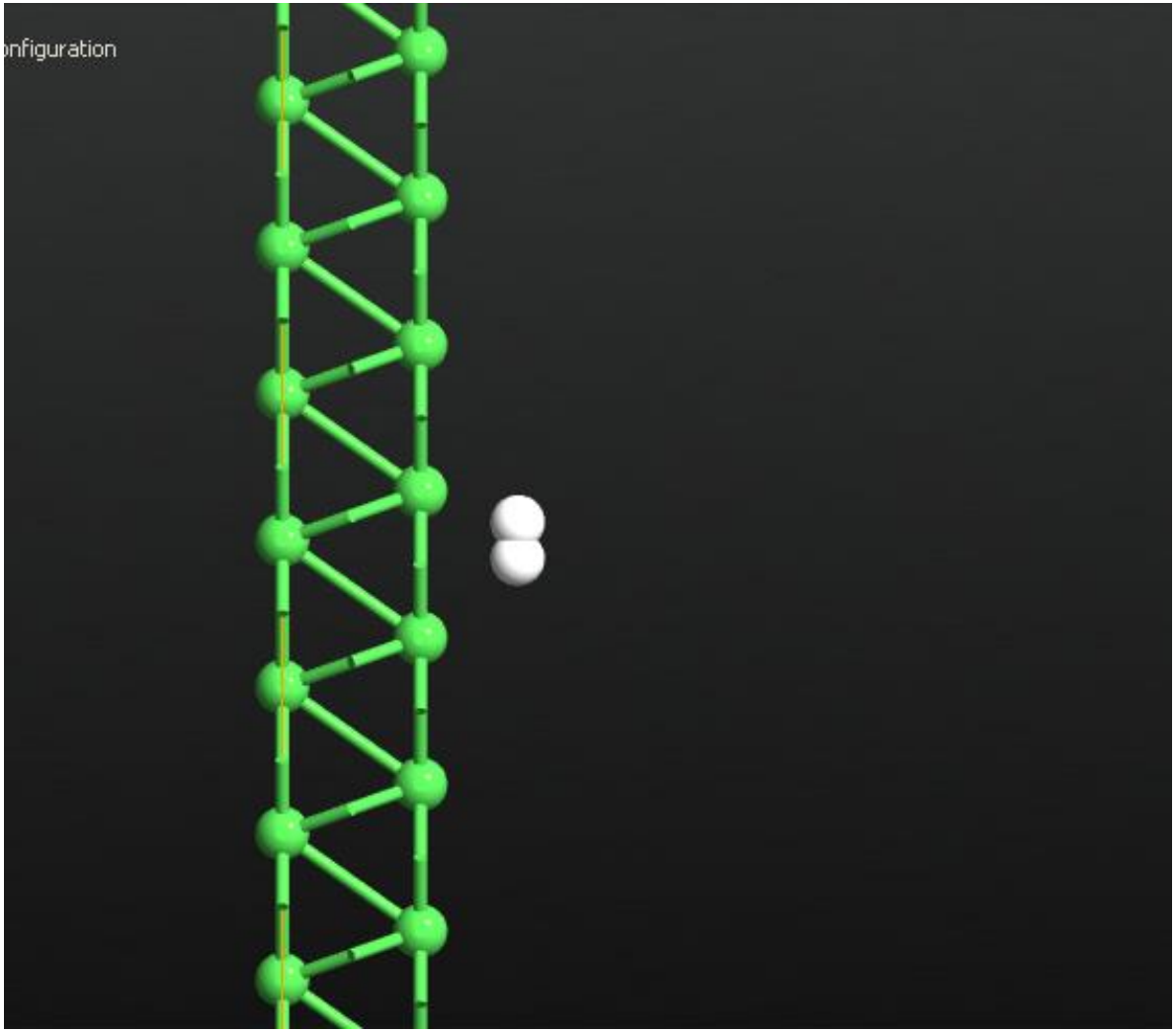
First: Understand How Platinum Works



H2 on NICKEL

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First: Understand How Platinum Works

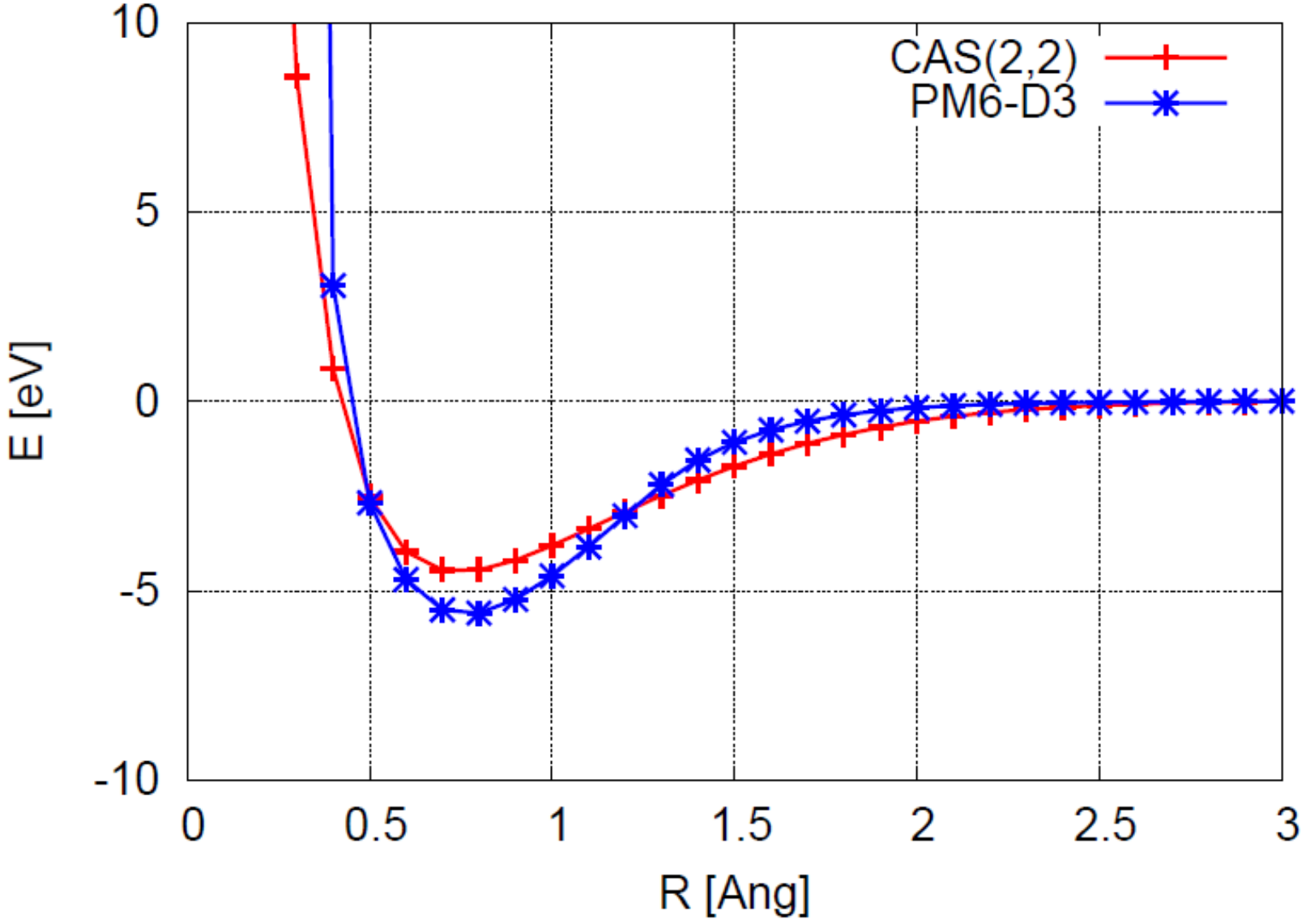
Probing by Molecular Dynamic Simulations

1) Differences in Structure?

2) Differences in Energy?

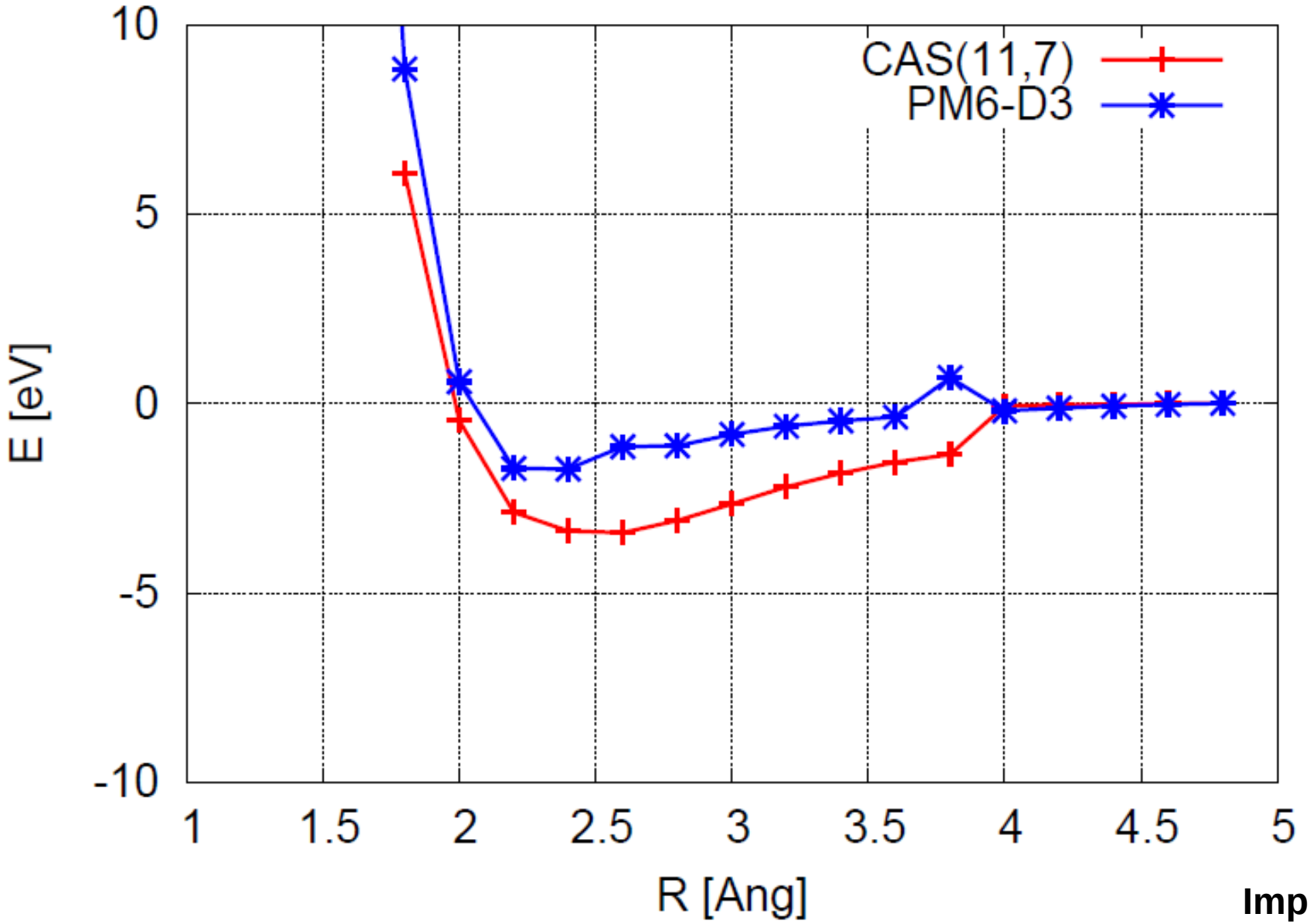
3) Differences in Charge Transfer: Use DFT or SEMD

SEMD Forces: H-H



OK

SEMD Forces: Pt-Pt



Needs Improvement!

PhD Program

By Research:

(1) Find suitable supervisors and co-supervisors

(2) Determine area(s) of common interests and develop a research proposal

(3) Apply through Univ. of Rwanda (UR)

(4) ~ $2,000 tuition per year

+ ~ $8,000 per year for support

(5) Begin research

(6) Pass the 'Qualifier' Exams

(7) Continue: Research, Papers, Defend, Graduate

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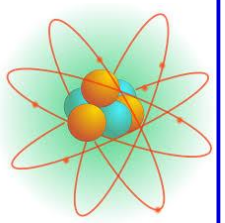
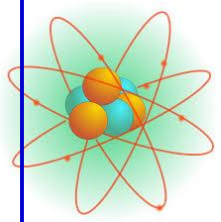
MSc Program: 2-yr





By Research:

(1) Apply online

(2) < Selection >

(3) ~ $2,000 tuition per year

+ ~ $8,000 per year for support

(4) 1st Year: BASIC PHYSICS (Revamp of Undergrad)

(5) 2nd Year: Specialize

- **High Energy Physics**
- **Condensed Matter Physics**
- **Solid Earth Physics (Geophysics)**

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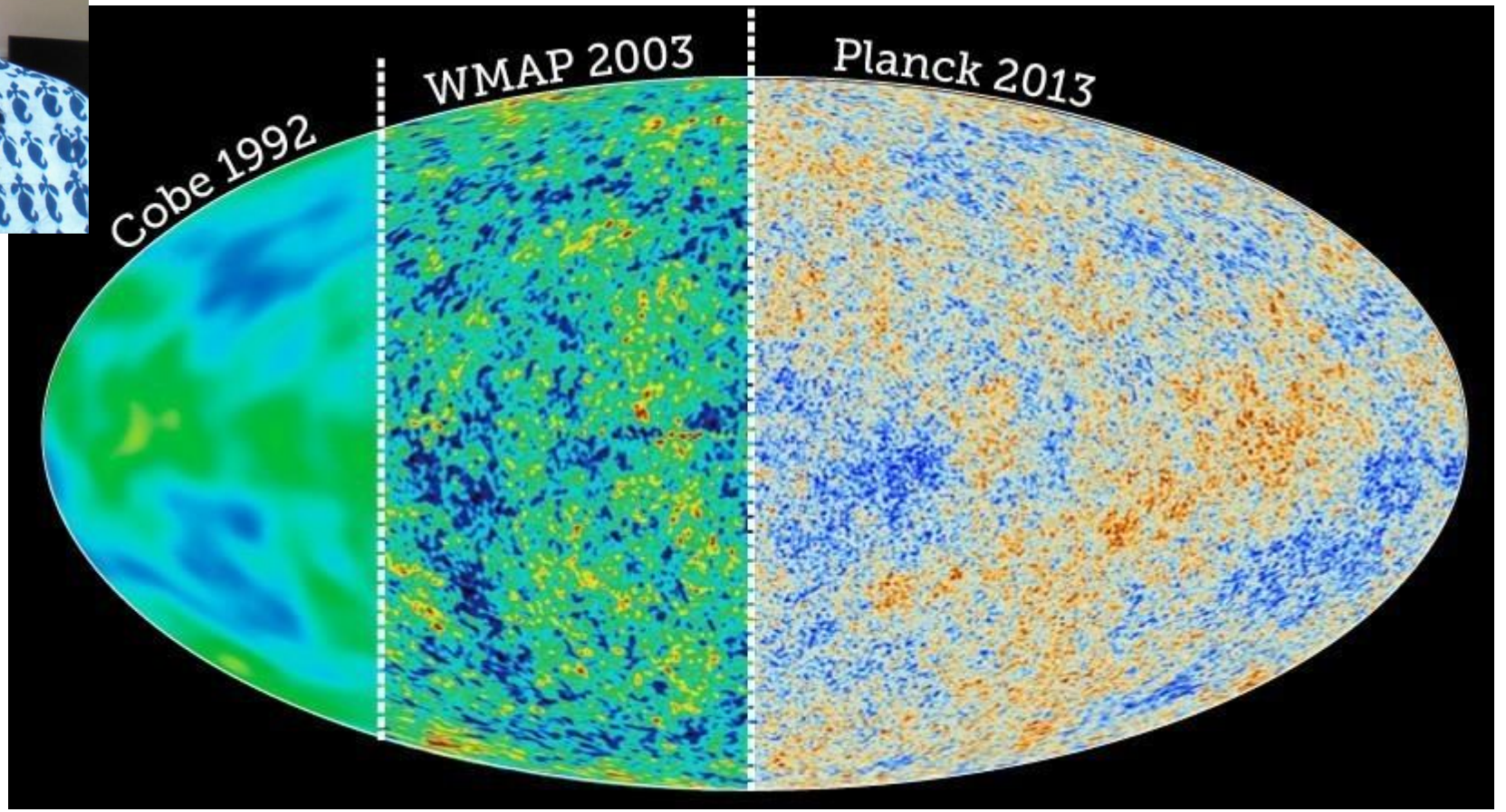
The origins of the Universe



Cosmic Microwave radiation, released when the Universe is very young.
It has small temperature fluctuations of 1/10.000.
It is used to infer the initial conditions of the Universe.

PROGRESS

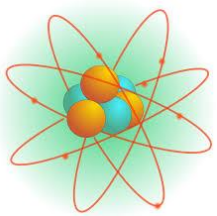
(And Future: 2017, 2018, ...)

2017:

* Four (4) Seminars (Sept – Dec)
* Hirings (Two scientists)

2018:

* Three Short Courses
  - June/July: SCITAP (Solar Cells In Theory And Practice)
* Three Workshops
  - May: IEEE Entrepreneurship Workshop
  - Oct: Women In Science
  - Oct: CODATA
* MSc students start in September
* INAUGURATION in October
* More hirings: i. Two/Three scientists,
  ii. Two Admin. Assts.
  iii. One IT



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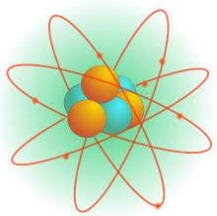

Come Join Us Now and In the future

INFO@EAIFR.ORG

www.EAIFR.org

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