BeamCats 2018

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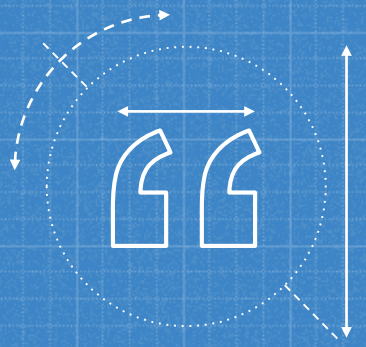
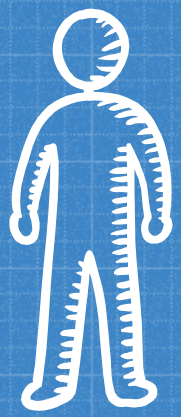
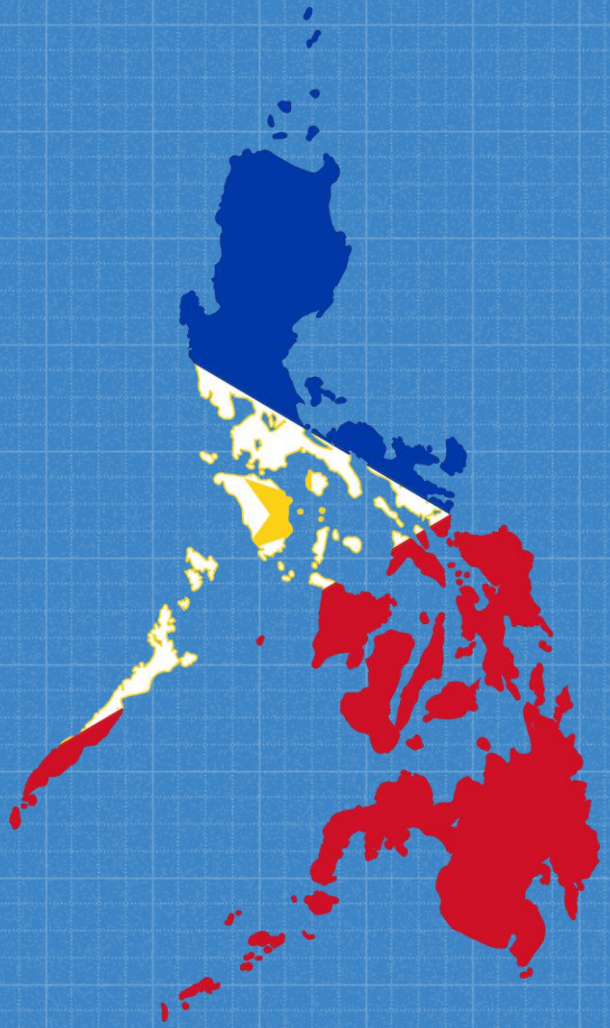
Advisors: Mr. Hill, Mr. Dickinson



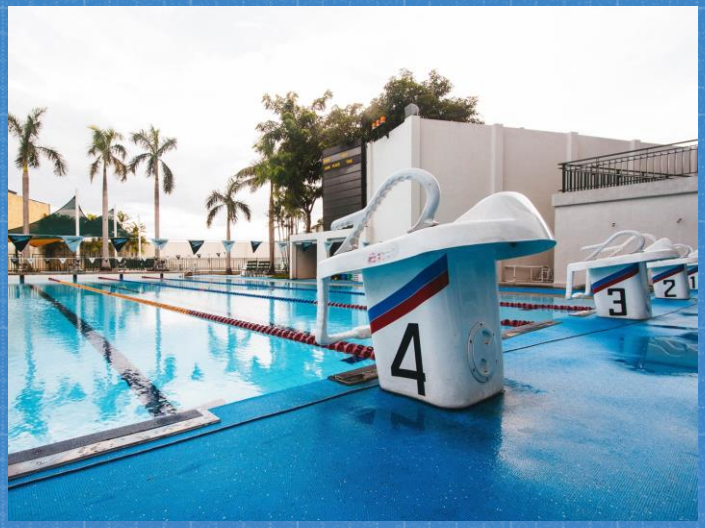
Who Are We?



The Philippines



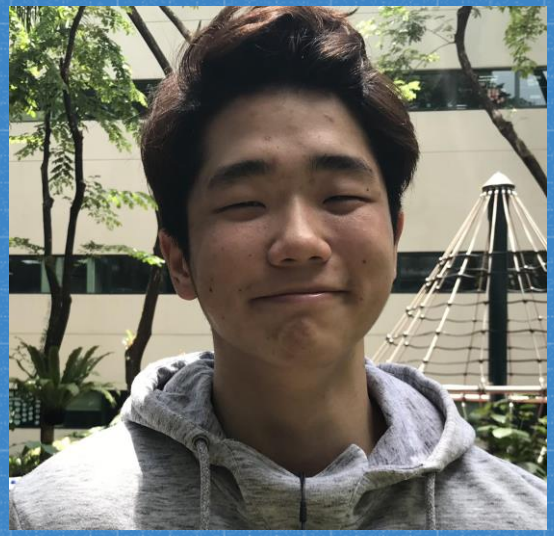
International School Manila



Astronomy Club

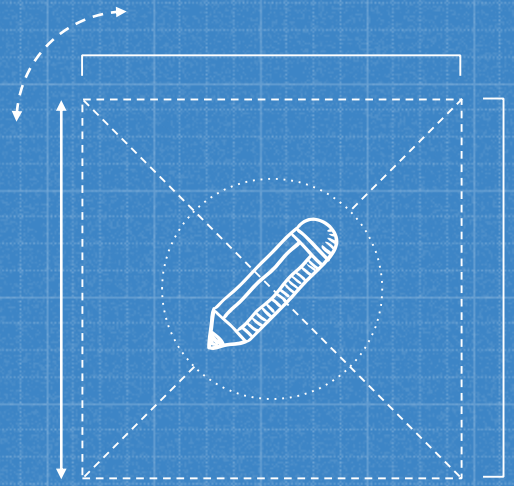
OUR MEMBERS

Sana & Sae Joon



Aarushi & Charvie

Ashish & Yash



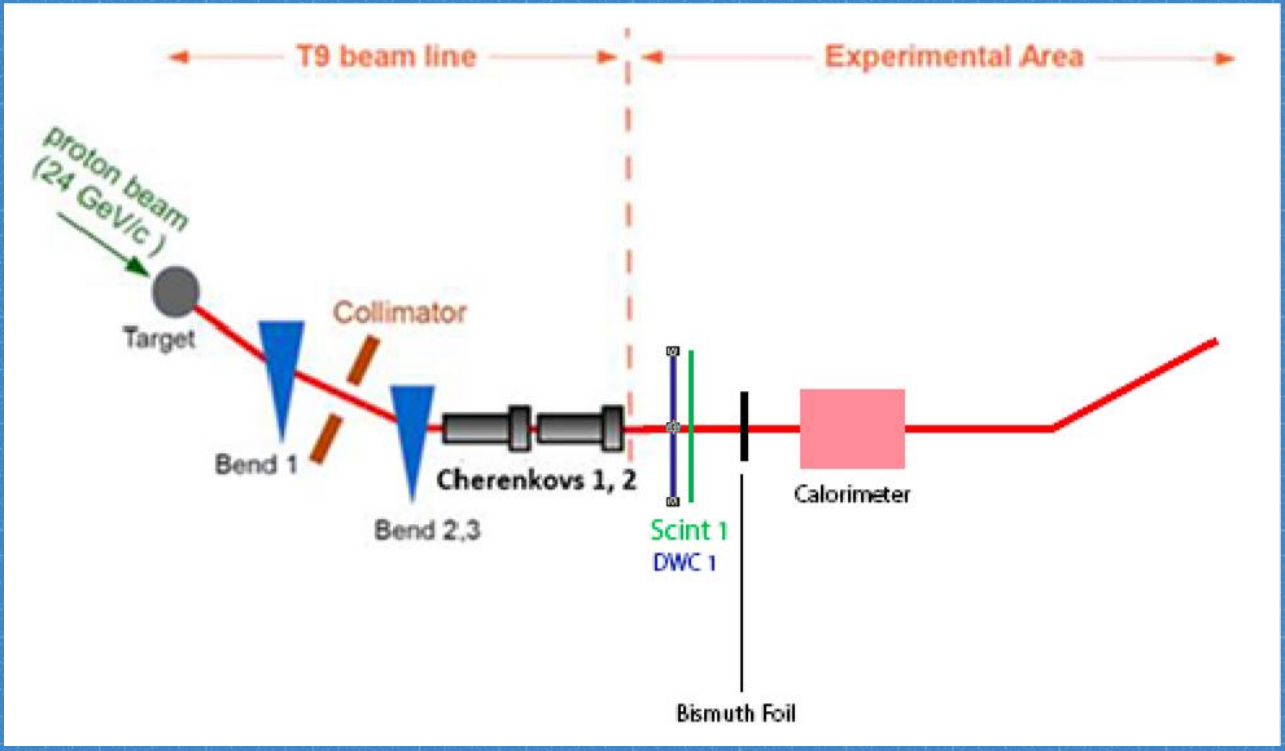
OUR PROPOSAL

Background

- Finding effective safe cancer therapy has been an issue of priority in the medical community.
- Two out of five individuals get diagnosed with cancer at least once in their lifetime
- The most common treatment options available today are chemotherapy, surgery and radiation therapy. These methods of treatment come with their own side-effects.

Last Year's Proposal

- Based off of study done in 1970s on pion therapy (abandoned)
- It had been recently discovered that using a heavy metal would increase the efficiency of pion therapy
- A calorimeter was used to measure the energies of nuclear fragments and determine their effectiveness



This Year's Proposal: The Improvements

- We came up with ways of quantifying our results using a bragg peak for pion beam therapy.
- Instead of simply measuring the amount of energy the isolated negative pion beam produced, we tried to emulate skin tissue using graphite oxide.
- **Independent Variables**: Depth and Initial Energy
- **Dependent Variable**: Output Energy

Why Graphite Oxide?

- Non-biological:
  - Feasible inside the accelerator.
- Composition:
  - 50.1% Carbon
  - 44.81% Oxygen
  - 2.69% Hydrogen

Overview of This Year’s Proposal

- Pions being light particles, have a high scattering potential. Thus effectively destroy cancerous cells.
- Negative pions, when captured by hydrogen atoms, replace the electron in its orbit.
- When this atom gets close to a heavier element like carbon, oxygen, or nitrogen in the tissue, the pion is transferred to its nucleus due to lower final binding energy.
- The pion is absorbed by the nucleus due to strong attraction, in a time that is shorter than its lifetime.
- 140 MeV of energy is released.

What have we done so far?

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