

From undergrad to grad school A personal perspective

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January 22th, 2021

Disclaimer

The contents are based on my personal experience, some may not work for you.

-> Try and experience for yourself, as you will try a lot of new things in your grad school journey.

I am not teaching you, I am just sharing my view.

-> Do not take it too seriously.

Most of the images are taken from the internet, i.e. the phdcomics.com

Words of encouragement

Some physicists I know publish paper monthly (>12 papers a year)

Some enjoys their work with 1 paper every 3-4 year

Some supervises >8 grad students a year

Some just like to teach basic course to undergrads

You can be anyone of them, just remember:

**Whether you think you can
or you can't, you're right.**

Henry Ford

Introduction

- Status: 3rd (final, hopefully) year PhD student (D3)
- Bachelor, master and doctorate courses from the same institution (HCMUS) in Vietnam.
- Supervisor: Prof. Dao Tien Khoa, most known for folding pot, CDM3Y int, nuclear rainbow.
- Collaborating with physicists from China, Japan, UK, and France.
- Theoretical direct nuclear reactions: elastic, inelastic, transfer, (p,pN) .
- Goal: understand nuclear physics as a unified picture
- I helped co-supervise few undergrads and master students.

For my published works, you can search me on GG Scholar using “Nguyen Tri Toan Phuc” or:

www.researchgate.net/profile/Nguyen_Tri_Toan_Phuc

Not much to find though...

Introduction

Also: I am married (happily), has one son, and like to play video games (rarely lately)



Main topic of my talk

How to **transition (evolve)** from an undergrad student to a graduate (master or doctorate) one. (in research-focused program)

Big problem: conducting the “research pipeline” in a more independent manner (i.e. mostly by yourself). Your supervisor will help you in many ways

2 main types of problems:

Technical problems: lack of skills (programming, math, etc..)

Mental problems: wrong mindset, ideas, expectations, ethics

The research pipeline

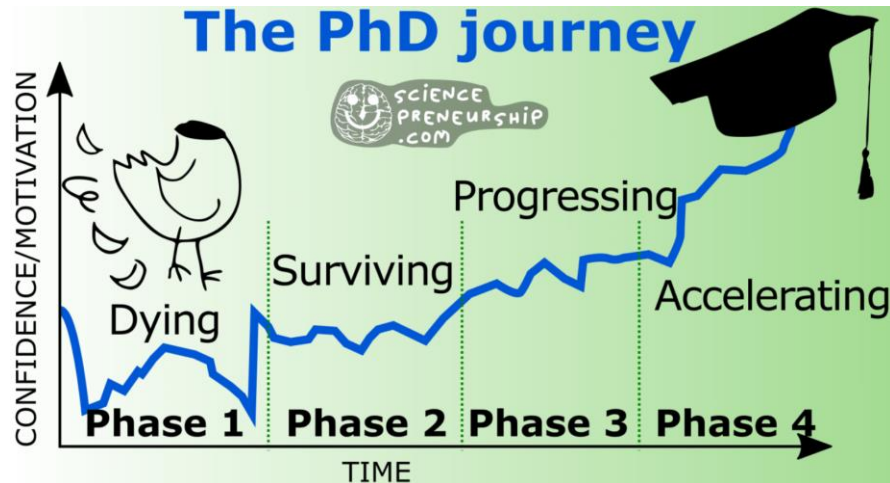
- Step one: write down the problem
- Step two: solve it because it's just similar to your homework, which itself is similar to a very specific question that your teacher has carefully taught you on class. Oh, your friend has solved it while looking for online answer, nice 😊
- Step three: get good grade and pass the exam
- Step four: repeat several times and get the diploma

Well, sorry but that's not how grad school work.

The research pipeline

Also known as “scientific research steps”

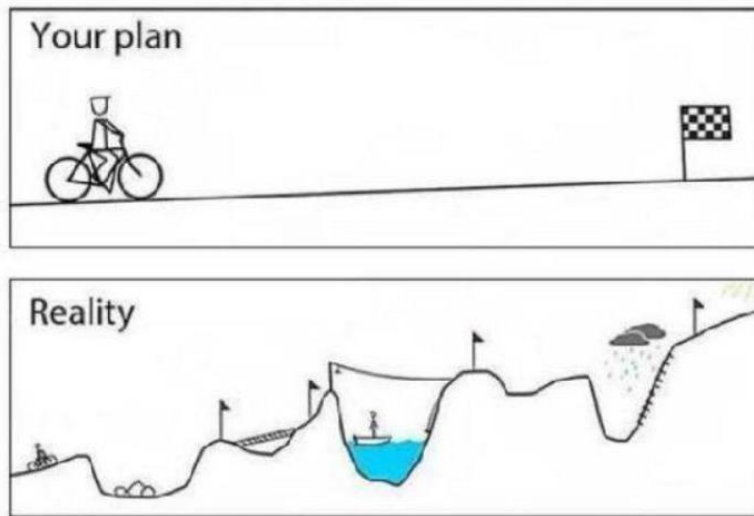
Basic Idea->Literature review->Specific ideas->Calculate->Results->
Discuss->(iterate)->meet the condition->write->cry and rewrite->
manuscript->submit->revise->resubmit->more crying and revise->
Hopefully paper accepted->PR it->thesis writing (lots of crying)
-> defend thesis -> hopefully get the diploma



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Be optimistic but always
prepare for the worst

Technical problems

These problems in general can be improved, you can clearly see the problems

Some related technical problems to theo. nucl. phys.

- Math: linear algebra, diff. eqn., integral eqn.,
- Quantum mechanics: operator formalism, scattering theory, diagonalization, angular momentum algebra
- Programming: Fortran, C/C++, parallel prog.
- Literature review, get the big (correct) picture
- Paper/report writing, presentation skill
- Communication skill, figure illustration

Types of grad school

Two main types:

- The continuous PhD program (5-7 years)
- The MsC (2 years) + PhD program (3-5 years)

What is grad school to you?

To me, the grad school journey is the commitment:

- To be specialized
- To explore new ideas, peoples, and yourself
- To enter the academic world
- To grow up

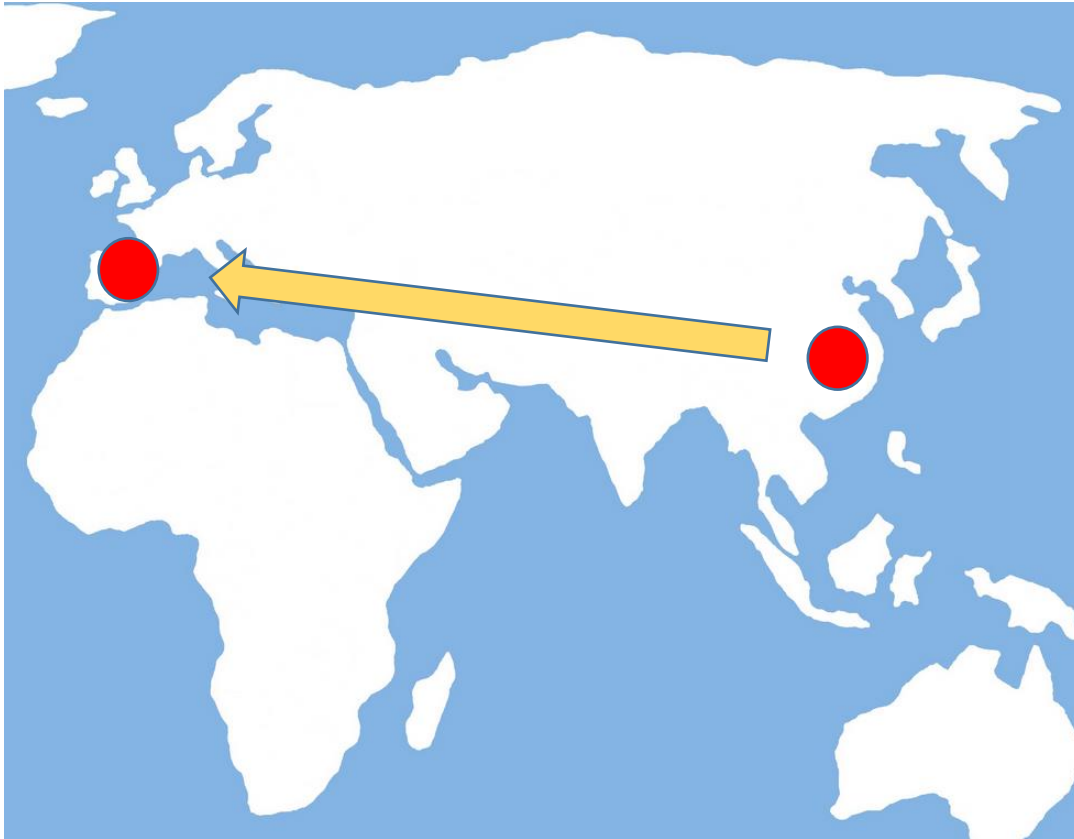
Undergrad

- Many small separated problems, take 10min – 1 week. Answer available.
- Well-defined problem
- Tools already in the textbook
- Grading is given regularly
- Exams each semester
- The lecturer duty is to make sure you understand everything
- Your report is judged by your lecturer
- You have lots of same-age classmates, whose knowledge similar to you

Grad

- Few big problems, take months-year. Answer is not that trivial
- You defined the problem
- Tools hidden. You find, learn, use by yourself, sometimes you invent the tool
- No grading, except for the final defense
- One (or few) big difficult defense
- The supervisor is expected that you understand everything by yourself
- Your report is review by unknown people, sometimes they are harsh
- You have few labmates, whose skill and knowledge wildly different from you

Your grad school journey



You have 5-7 years to finish and your “academic” successful determined by the distance you travel

-> It is up to you to decide your way

By car



This is you as a grad student

Your grad school journey (cont.)



Your skill/ability is the engine, it determines how fast you go



Your motivation is the wheels, it helps you move forward



Your stamina is the fuel tank, it requires regularly fill up (eat & rest)



Your advisor is your 2nd seat **companion**.
HE IS NOT THE DRIVER, YOU ARE!

Remember to perform regular car maintenance or you will not go far
-> Exercise, days off

Your grad school journey (cont.)

Most important is your mental clarity: windshield
You will not go anywhere without seeing the road
Also, it is dangerous!



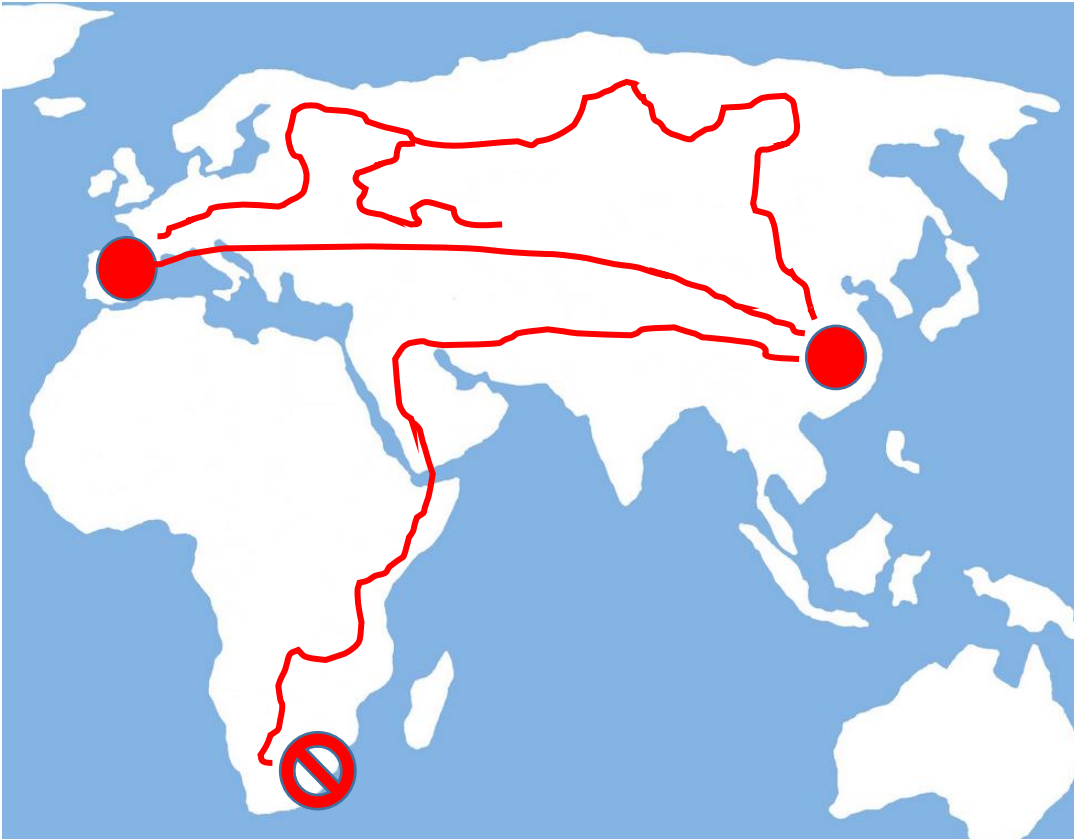
You can be this or this



-> Which car you are depends mostly on your technical skill

Beware that a hypercar can also get lost (without proper guidance)
or get accident (when drive fast + wreckless)

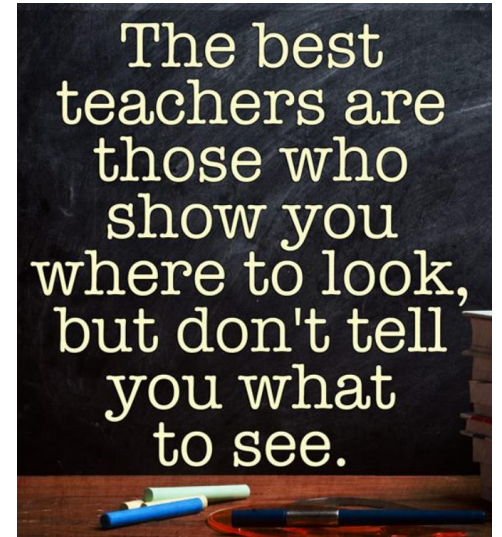
Your grad school journey in reality



Some people finish faster than others, some slower, some get stuck, some give up.

A good supervisor will show you the right direction but will not show you the exactly road

The best teachers are those who show you where to look, but don't tell you what to see.



Compared to undergrad school



The biggest difference in supervising: Hand-holding and mentoring

It is required that you are: independent/ autonomous

Can **by yourself** survey/review the literature, identify/define the problem, find/invent the required tools, fix the countless bugs, comment/discuss your results, plot the right figure, write the paper/ thesis.

Your supervisor gives the general idea/direction and may provide feedbacks on those steps

My solutions

- Always try your best to do a completed research pipeline by yourself.
- It is recommended to seek helps from others but do not rely on them.
- Pay close attention to literally everything, every single detail.
- There are numerous books, course, resources on-line about how to do a PhD or scientific research methods, they do help a lot.
- Chat, small talk, discuss with your labmates and colleague.
- Read and write a lot.
- Never believe/trust any information, confirm it with multiple sources and by yourself.
- Critical thinking, always ask why (to yourself), and do not consider anything is trivial.
- Stay focus, stay motivated, stay healthy. Believe in yourself.

Your time is very flexible

PRO

YOU CAN WORK WHENEVER
YOU WANT! EVERY DAY
IS A SATURDAY!



JORGE CHAM © 2017

CON

YOU WORK ON SATURDAYS.



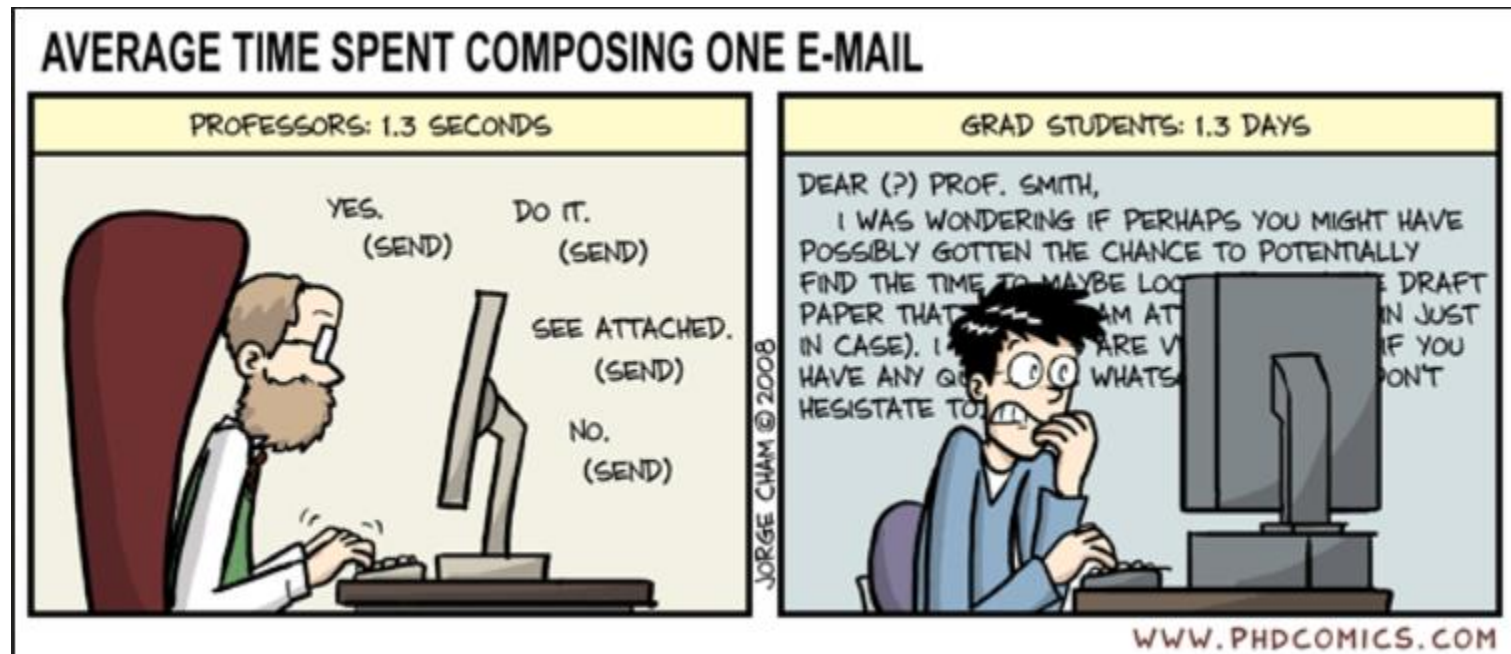
WWW.PHDCOMICS.COM

Tips:

Professors are super busy, try your best to not waste their time.

“The greatest gift you can give someone is your time, because when you give your time you are giving a portion of your life that you will never get back.”

-> Appreciate all the time and efforts people spend for you.



Tips:

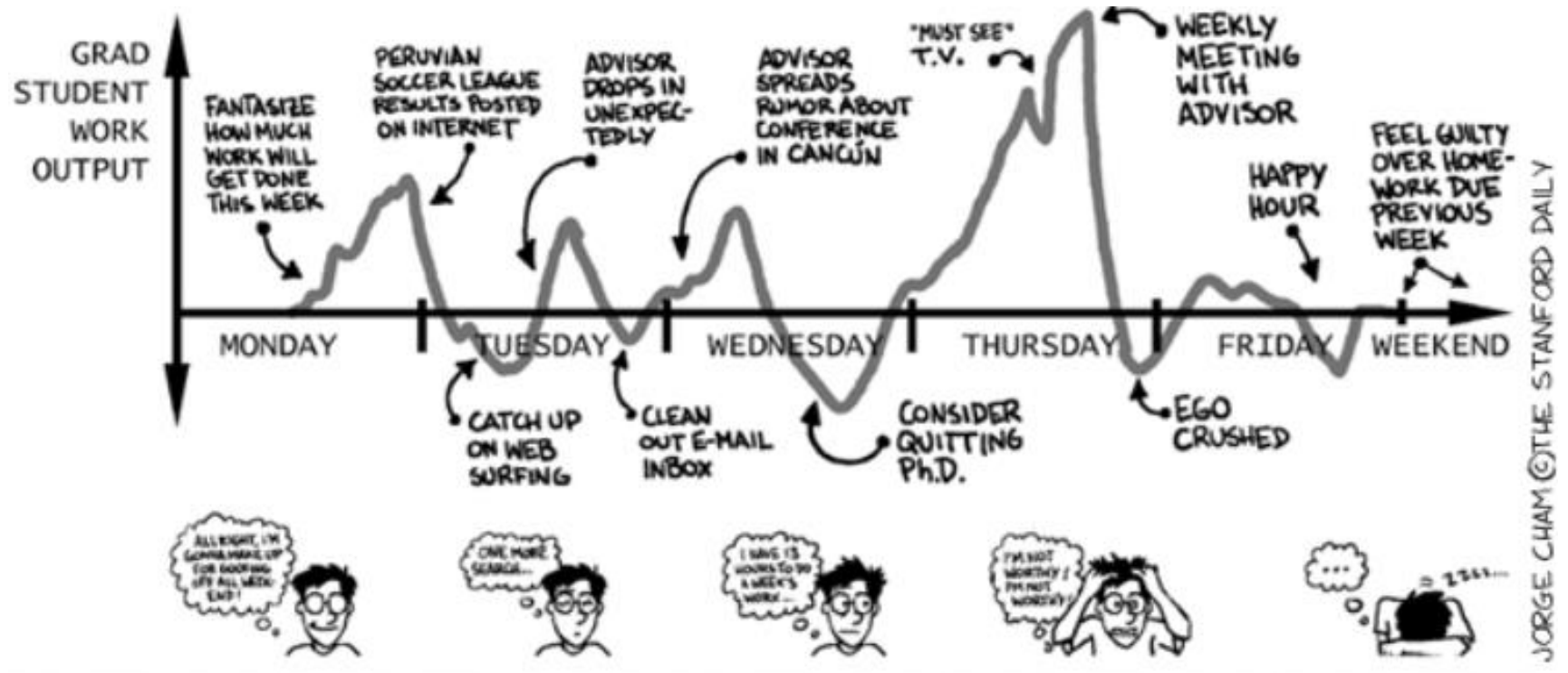
Try your best to NOT **procrastinate**

There are many ways, look for them on the web.



Tips:

It is OK to have ups and downs (regularly)



Boost your self esteem by looking
for similar people

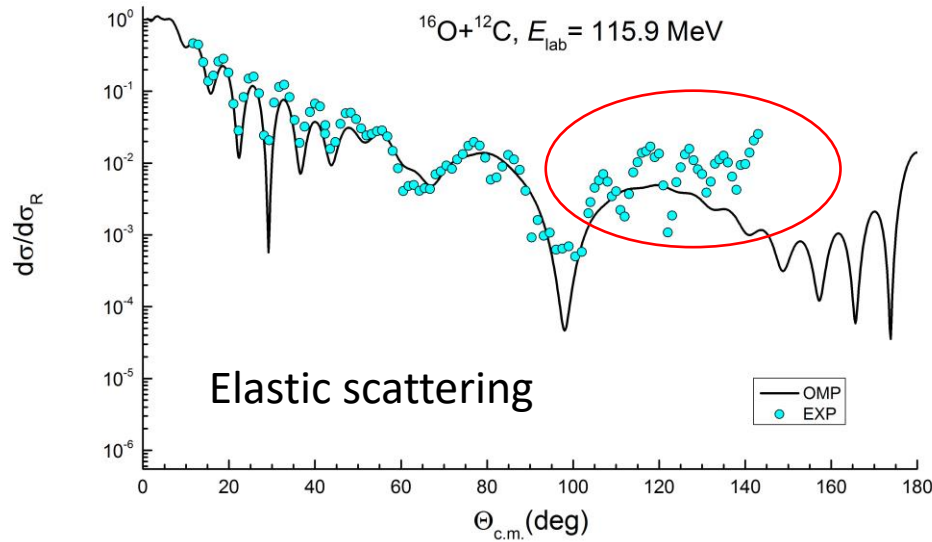
The phdcomics.com



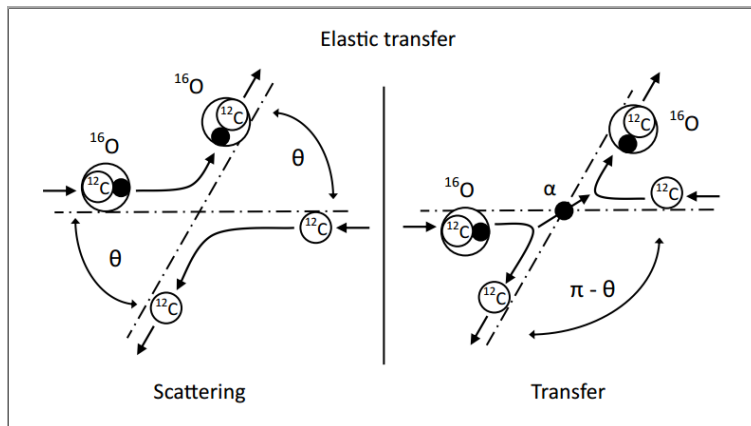
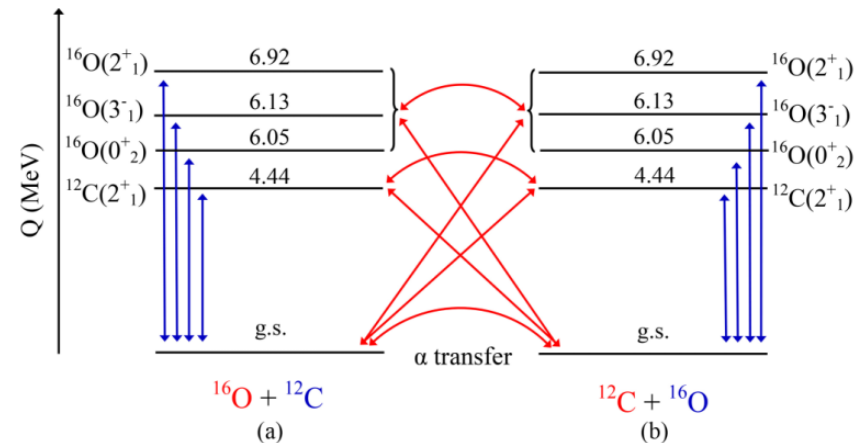
WARNING!

READING THIS ENTIRE ARCHIVE
CAN BE HAZARDOUS TO YOUR
RESEARCH. PROCEED WITH CAUTION
AND USE ONLY IN MODERATION

A small study case



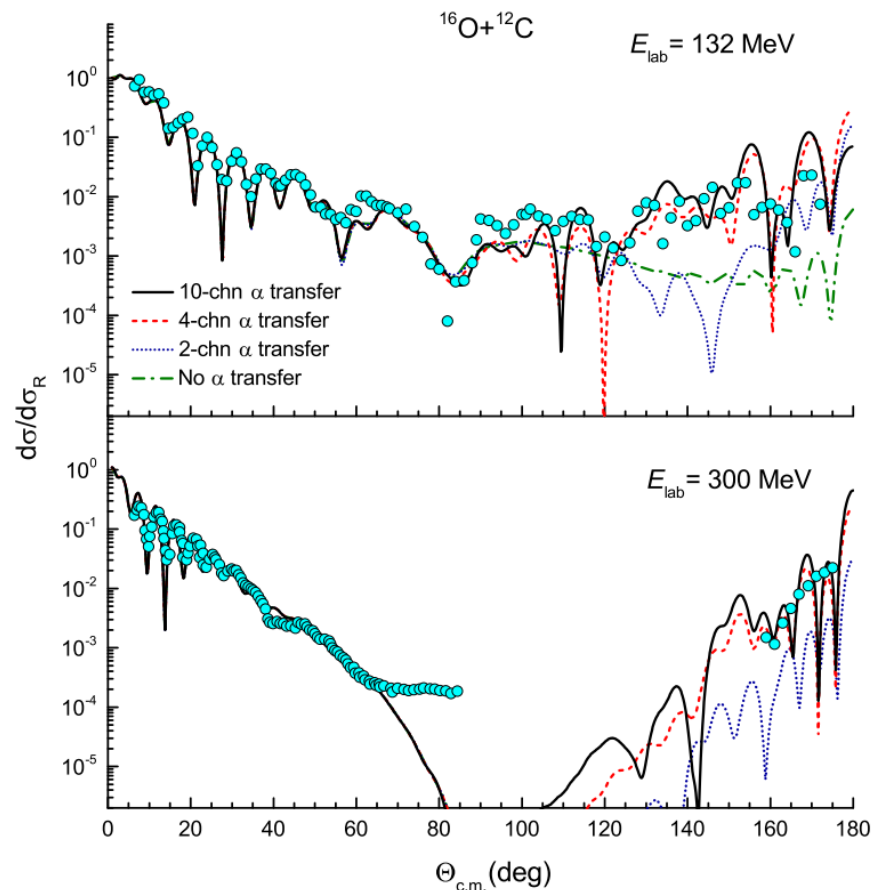
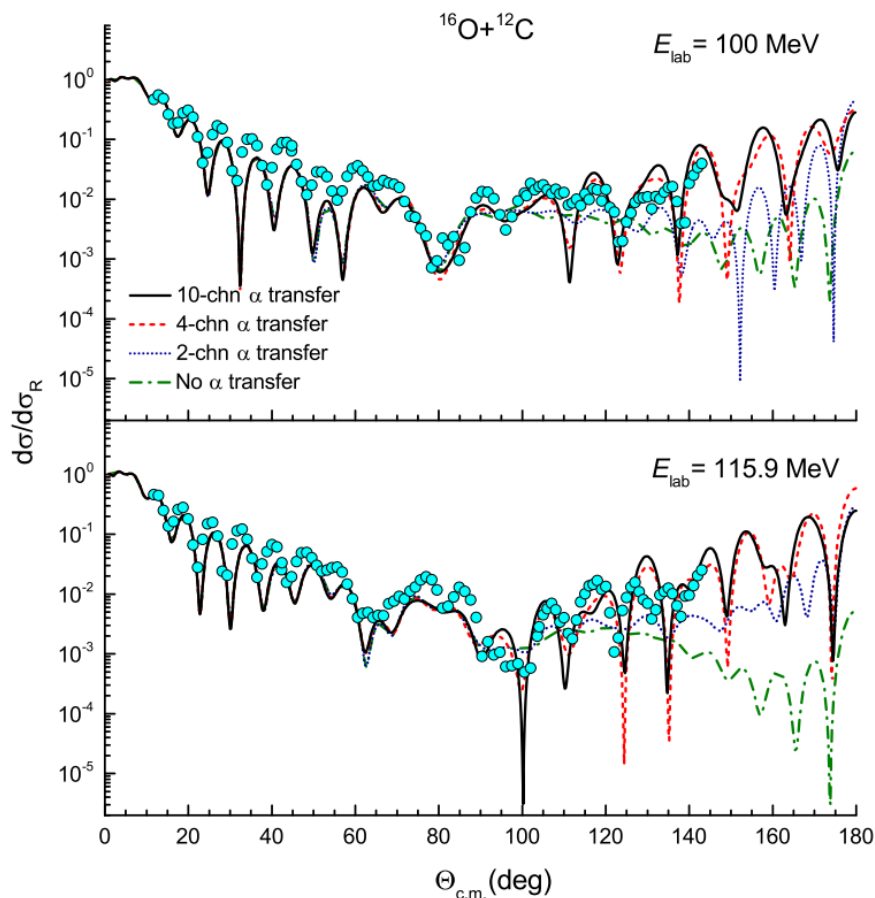
Problem: what is the origin of these oscillation? Can we describe them using available models?



Transfer, Feshbach's formalism, Coupled Reaction Channel, Fresco, alpha spectroscopic factor, alpha cluster model, inelastic scattering, form factor, absorption of the OP, folding potential, SU(3) symmetry, shell model, core excitation, nuclear rainbow, near/far-side decompose, semiclassical scattering.

A small study case

One year after first submitted.



N.T.T.P, N.H. Phuc, D.T. Khoa, PRC 98, 024613 (2018)

A photograph of a blue and orange bird perched on a stone pillar. A vibrant rainbow arches across the sky in the background. The scene is set outdoors with trees and a stone wall visible in the foreground.

**Thank you for your attention
and good luck**

Appendix