How to give a good presentation

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NTHU Institute of Astronomy, 12/25/2020

How to give a ~~good~~ bad presentation

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Introduction

Giving presentations is an essential skill not only in academic but also in industry. Studies have shown that giving a good presentation would have several positive impacts on one's career, including visibility of research results, introducing opportunities for collaboration, higher chances of getting a job offer, positive personal impression, etc. The advantages are many. That's why people often say "every talk is a job talk".

This is important stuff but I don’t want you to read

Investigating feeding and feedback of the central SMBH is key to understanding the dynamics and thermo- dynamics of the ICM in the cores of galaxy clusters. Bub- bles inflated by AGN jets could stir up the gas, provide heat to the ICM to counteract radiative cooling glob- ally, and could trigger cold-gas condensation due to local thermal instabilities. While kinetic-energy-dominated jets have been extensively studied using purely hydrody- namic simulations, the effects of CR-dominated jets are less well understood. To this end, we perform 3D hydro- dynamic simulations of CR-dominated jets in a Perseus- like cluster to study the detailed evolution of a single AGN outburst. In particular, we focus on their impact on the process of heating and cooling, the generation of turbulence, and the observable signatures. We con- trast CR-dominated jets with kinetic-energy-dominated jets, and we compare simulations with and without CR transport processes. Our main results are as follows.

By injecting jets with different energy partitions in kinetic and CR forms while keeping jet momentum the same, we confirm that kinetic-jet inflated bubbles tend to be more elongated, whereas fatter bubbles such as the young cavities observed at the center of the Perseus cluster are more easily produced by CR- dominated jets.

CR bubbles can drive a more significant expansion of the hot ICM due to buoyancy and larger cross sections, which helps to suppress radiative cooling by removing gas with short cooling times near the cluster center. Since it takes longer times for the ICM to cool again and feed the SMBH, this effect could explain the more episodic AGN activity seen in previous simulations of self-regulated CR- jet feedback.

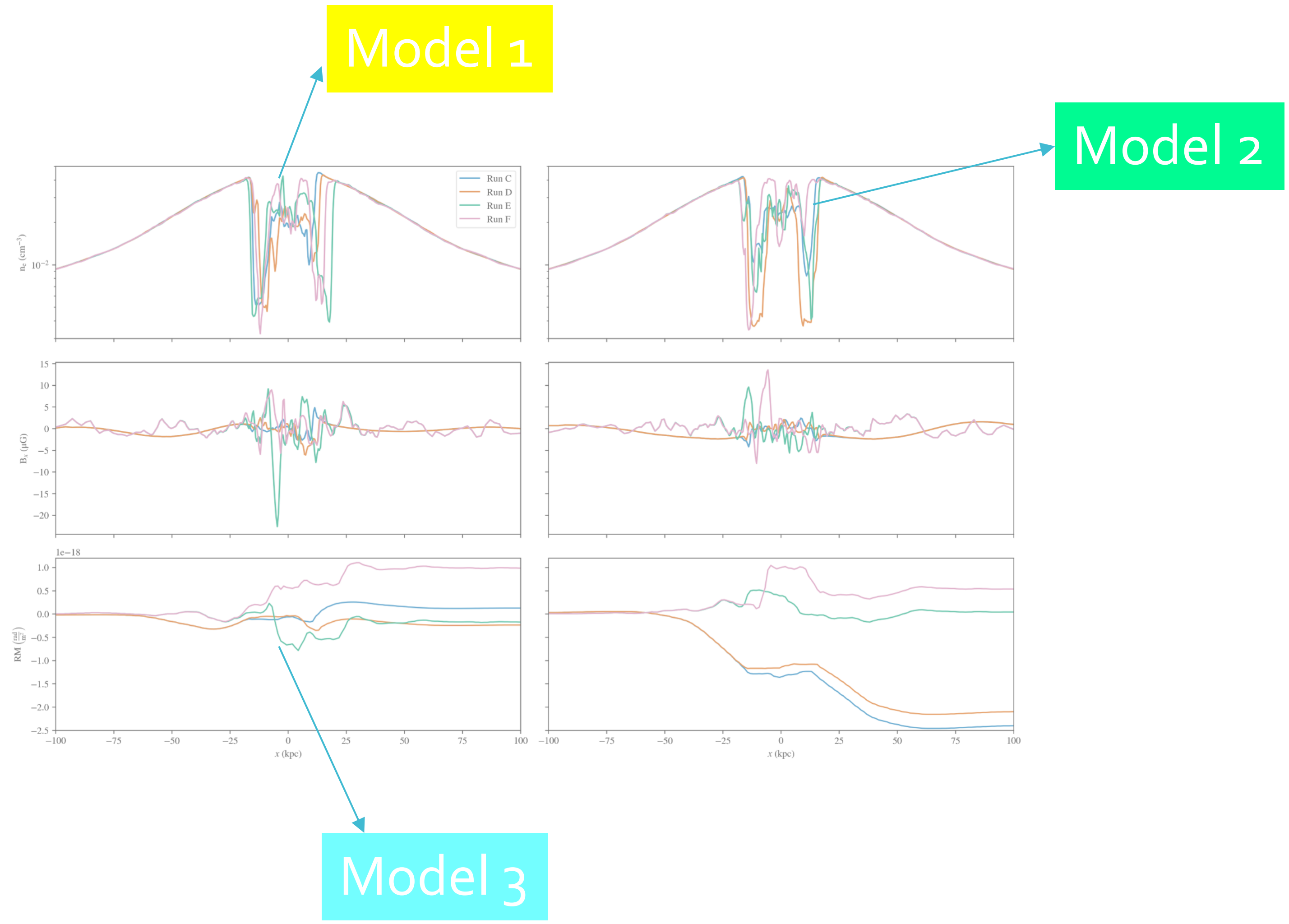
Heating by CR jets is less efficient than kinetic jets because less thermal energy is contained within the CR bubbles that could be accessed by the ICM through di- rect/turbulent mixing. The inefficient heating, together with adiabatic cooling associated with the expansion of the atmosphere, induces episodes of cold-gas formation during the bubble formation. This condensed multiphase gas is later crucial for the triggering of the AGN via CCA, which is the main agent of the feedback self-regulation.

The evolution of the cold gas sensitively depends on whether CR transport mechanisms are included or not. With transport by either diffusion or streaming, the CRs could escape the bubbles and interact with the ICM, thereby providing heating and greatly reducing the amount of cold gas at later times. This could explain

These are equations I am sure you all understand

$$
\begin{aligned}
R_{\eta\eta} = & -\frac{2a^2\frac{\partial\psi}{\partial\theta}\cot\theta}{\delta\psi} + \frac{2ac\frac{\partial\psi}{\partial\eta}\cot\theta}{\delta\psi} + \frac{a\frac{\partial c}{\partial\eta}\cot\theta}{\delta} - \frac{\frac{\partial a}{\partial\eta}c\cot\theta}{2\delta} - \frac{a\frac{\partial a}{\partial\theta}\cot\theta}{2\delta} - \frac{2a^2\frac{\partial^2\psi}{\partial\theta^2}}{\delta\psi} \\
& -\frac{2a^2(\frac{\partial\psi}{\partial\theta})^2}{\delta\psi^2} + \frac{4ac\frac{\partial\psi}{\partial\eta}\frac{\partial\psi}{\partial\theta}}{\delta\psi^2} - \frac{a^2\frac{\partial d}{\partial\theta}\frac{\partial\psi}{\partial\theta}}{\delta d\psi} + \frac{ac\frac{\partial d}{\partial\eta}\frac{\partial\psi}{\partial\theta}}{\delta d\psi} + \frac{2a\frac{\partial c}{\partial\eta}\frac{\partial\psi}{\partial\theta}}{\delta\psi} - \frac{\frac{\partial a}{\partial\eta}c\frac{\partial\psi}{\partial\theta}}{\delta\psi} \\
& -\frac{3a\frac{\partial a}{\partial\theta}\frac{\partial\psi}{\partial\theta}}{\delta\psi} - \frac{2a^2c\frac{\partial c}{\partial\theta}\frac{\partial\psi}{\partial\theta}}{\delta^2\psi} + \frac{2a^2b\frac{\partial c}{\partial\eta}\frac{\partial\psi}{\partial\theta}}{\delta^2\psi} - \frac{a^2\frac{\partial b}{\partial\eta}c\frac{\partial\psi}{\partial\theta}}{\delta^2\psi} - \frac{a\frac{\partial a}{\partial\eta}bc\frac{\partial\psi}{\partial\theta}}{\delta^2\psi} + \frac{a^3\frac{\partial b}{\partial\theta}\frac{\partial\psi}{\partial\theta}}{\delta^2\psi} \\
& +\frac{a^2\frac{\partial a}{\partial\theta}b\frac{\partial\psi}{\partial\theta}}{\delta^2\psi} - \frac{2ab\frac{\partial^2\psi}{\partial\eta^2}}{\delta\psi} - \frac{2\frac{\partial^2\psi}{\partial\eta^2}}{\psi} + \frac{4ac\frac{\partial^2\psi}{\partial\eta\partial\theta}}{\delta\psi} - \frac{2ab(\frac{\partial\psi}{\partial\eta})^2}{\delta\psi^2} + \frac{6(\frac{\partial\psi}{\partial\eta})^2}{\psi^2} \\
& +\frac{ac\frac{\partial d}{\partial\theta}\frac{\partial\psi}{\partial\eta}}{\delta d\psi} - \frac{ab\frac{\partial d}{\partial\eta}\frac{\partial\psi}{\partial\eta}}{\delta d\psi} - \frac{2c\frac{\partial c}{\partial\eta}\frac{\partial\psi}{\partial\eta}}{\delta\psi} + \frac{\frac{\partial a}{\partial\theta}c\frac{\partial\psi}{\partial\eta}}{\delta\psi} - \frac{2a\frac{\partial b}{\partial\eta}\frac{\partial\psi}{\partial\eta}}{\delta\psi} + \frac{\frac{\partial a}{\partial\eta}b\frac{\partial\psi}{\partial\eta}}{\delta\psi} \\
& +\frac{2a^2b\frac{\partial c}{\partial\theta}\frac{\partial\psi}{\partial\eta}}{\delta^2\psi} - \frac{2abc\frac{\partial c}{\partial\eta}\frac{\partial\psi}{\partial\eta}}{\delta^2\psi} - \frac{a^2\frac{\partial b}{\partial\theta}c\frac{\partial\psi}{\partial\eta}}{\delta^2\psi} - \frac{a\frac{\partial a}{\partial\theta}bc\frac{\partial\psi}{\partial\eta}}{\delta^2\psi} + \frac{a^2b\frac{\partial b}{\partial\eta}\frac{\partial\psi}{\partial\eta}}{\delta^2\psi} + \frac{a\frac{\partial a}{\partial\eta}b^2\frac{\partial\psi}{\partial\eta}}{\delta^2\psi} \\
& +\frac{a\frac{\partial c}{\partial\eta}\frac{\partial d}{\partial\theta}}{2\delta d} - \frac{\frac{\partial a}{\partial\eta}c\frac{\partial d}{\partial\theta}}{4\delta d} - \frac{a\frac{\partial a}{\partial\theta}\frac{\partial d}{\partial\theta}}{4\delta d} - \frac{\frac{\partial^2 d}{\partial\eta^2}}{2d} + \frac{(\frac{\partial d}{\partial\eta})^2}{4d^2} - \frac{c\frac{\partial c}{\partial\eta}\frac{\partial d}{\partial\eta}}{2\delta d} \\
& +\frac{\frac{\partial a}{\partial\theta}c\frac{\partial d}{\partial\eta}}{4\delta d} + \frac{\frac{\partial a}{\partial\eta}b\frac{\partial d}{\partial\eta}}{4\delta d} + \frac{a\frac{\partial^2 c}{\partial\eta\partial\theta}}{\delta} - \frac{a\frac{\partial^2 b}{\partial\eta^2}}{2\delta} - \frac{a\frac{\partial^2 a}{\partial\theta^2}}{2\delta} + \frac{ac\frac{\partial c}{\partial\eta}\frac{\partial c}{\partial\theta}}{\delta^2}
\end{aligned}
$$

This is the key figure



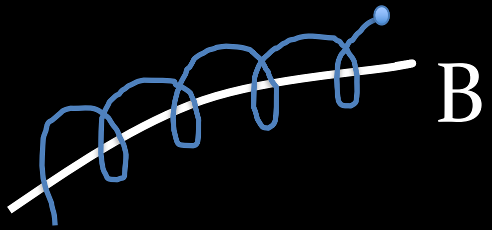
Possible interpretations of the results

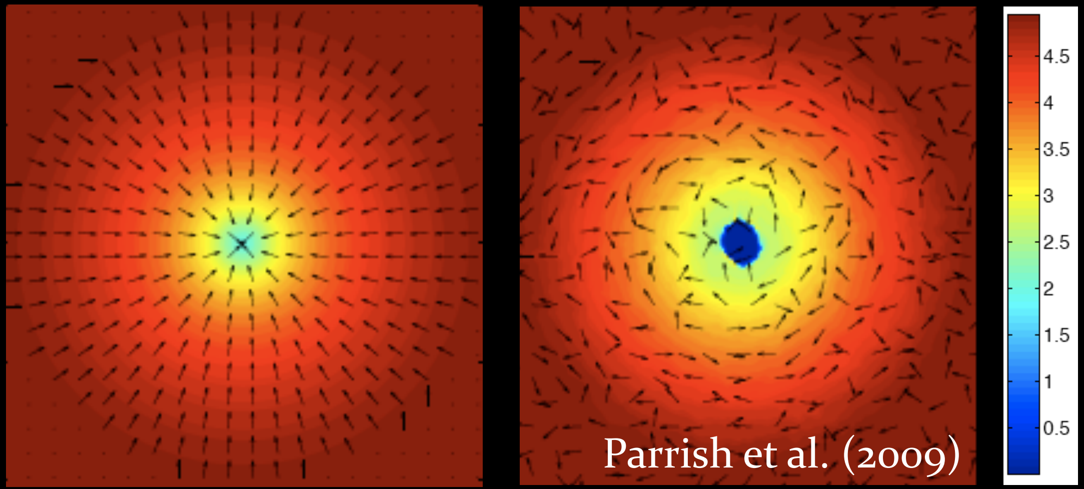
- Model 1 presents a better fit to the observed data
- The differences between Model 1 and 2 are due to measurement errors
- Model 3 is currently ruled out by the data already
- I would be amazed if you are still following what I am saying

(Don't use too many fancy animations)

Q: Roles of thermal conduction?

- Conductive heating from cluster outskirts
- Anisotropic conduction -> HBI (Quataert 2007)
- Final B azimuthal, shut off conduction

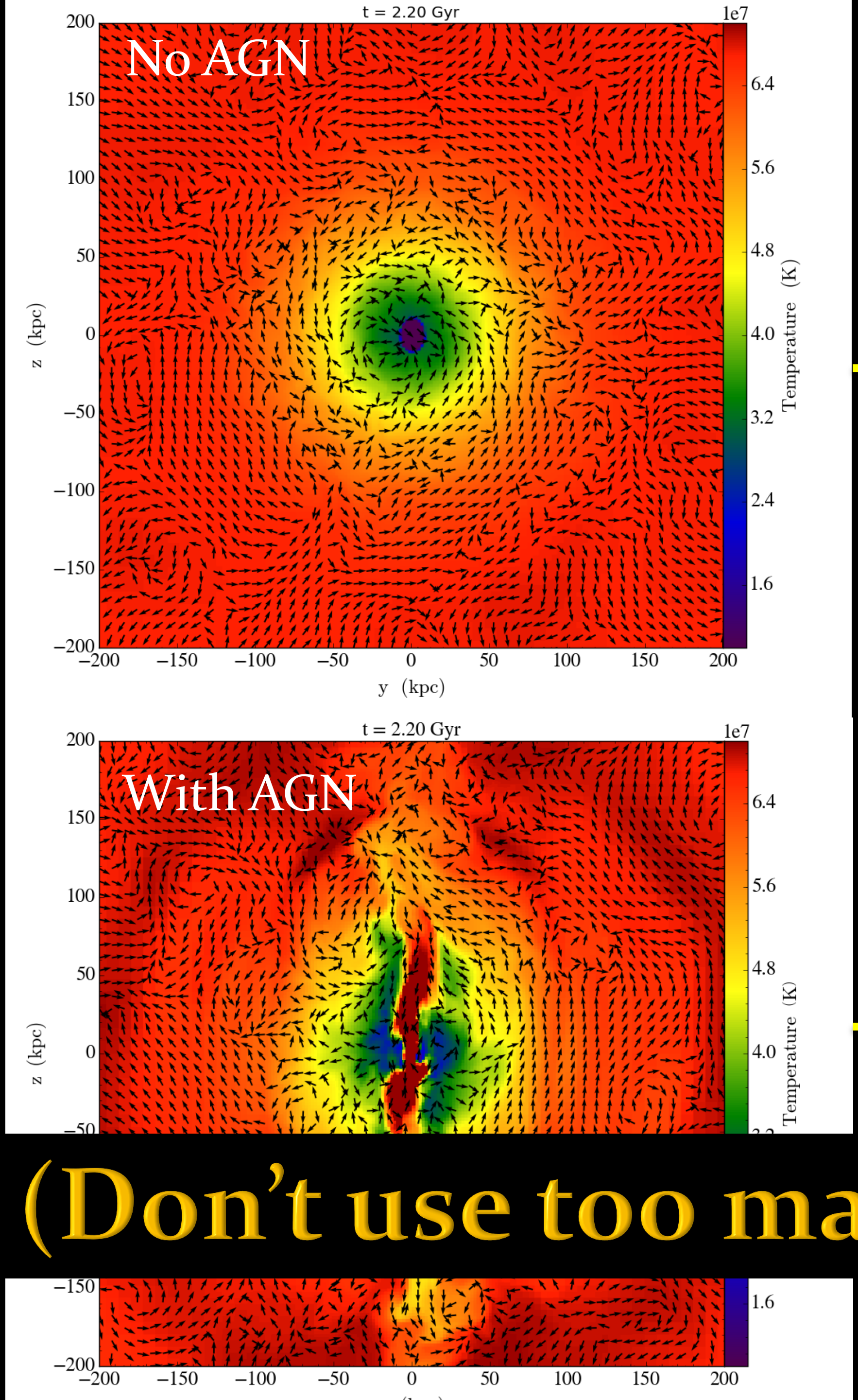




Parrish et al. (2009)

 or  ??

(Don't go overtime and ignore the moderator)



Cooling catastrophe @ t~0.3Gyr

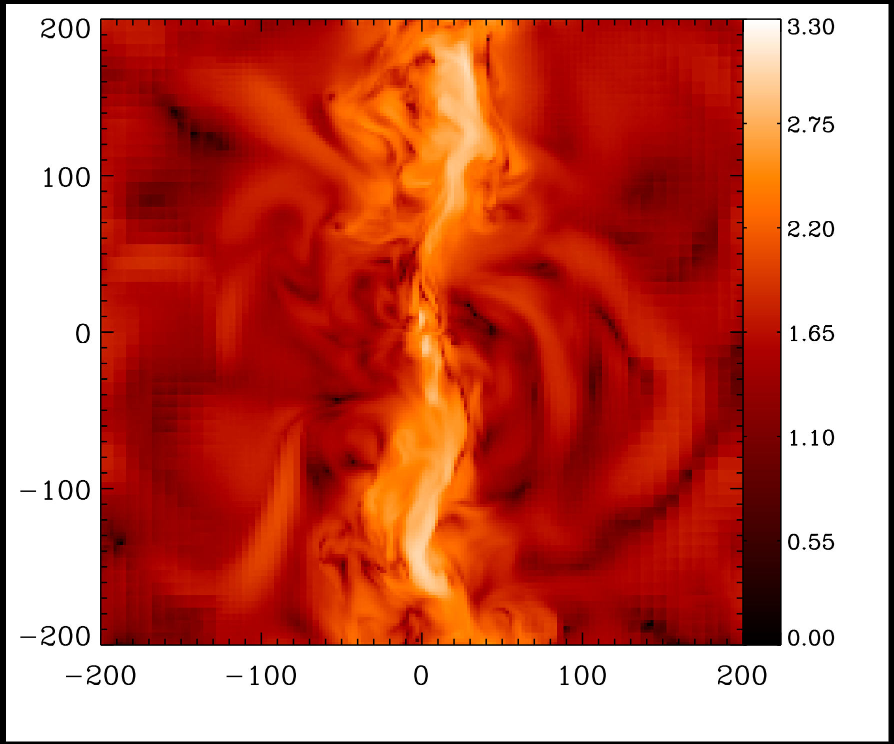
Self-regulation

(Don't use too many fancy transitions)

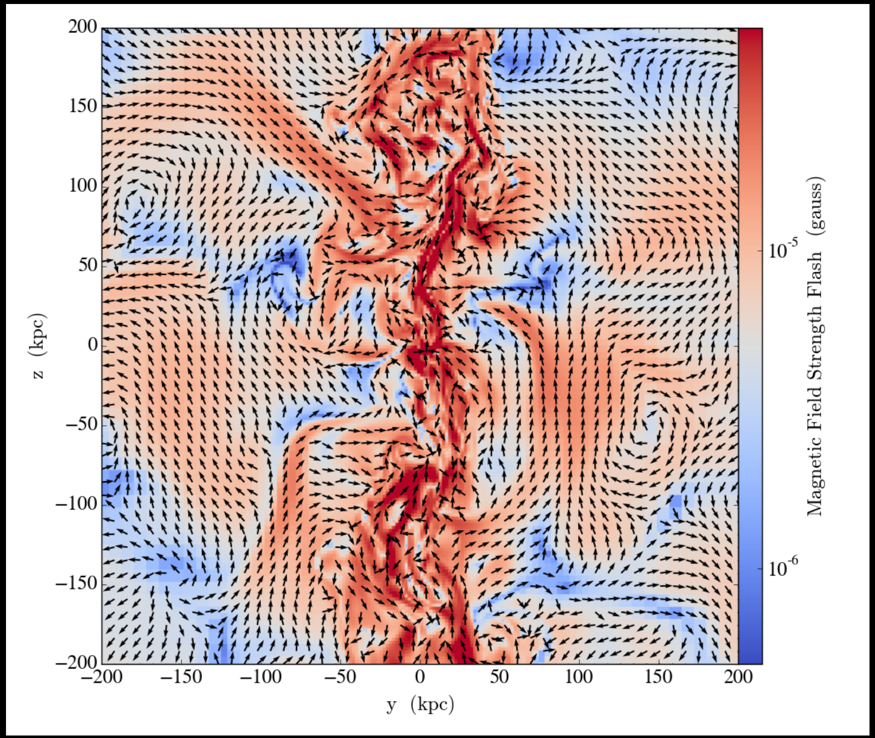
Yang & Reynolds (2016a)

AGN counteracts HBI

Turbulent velocity

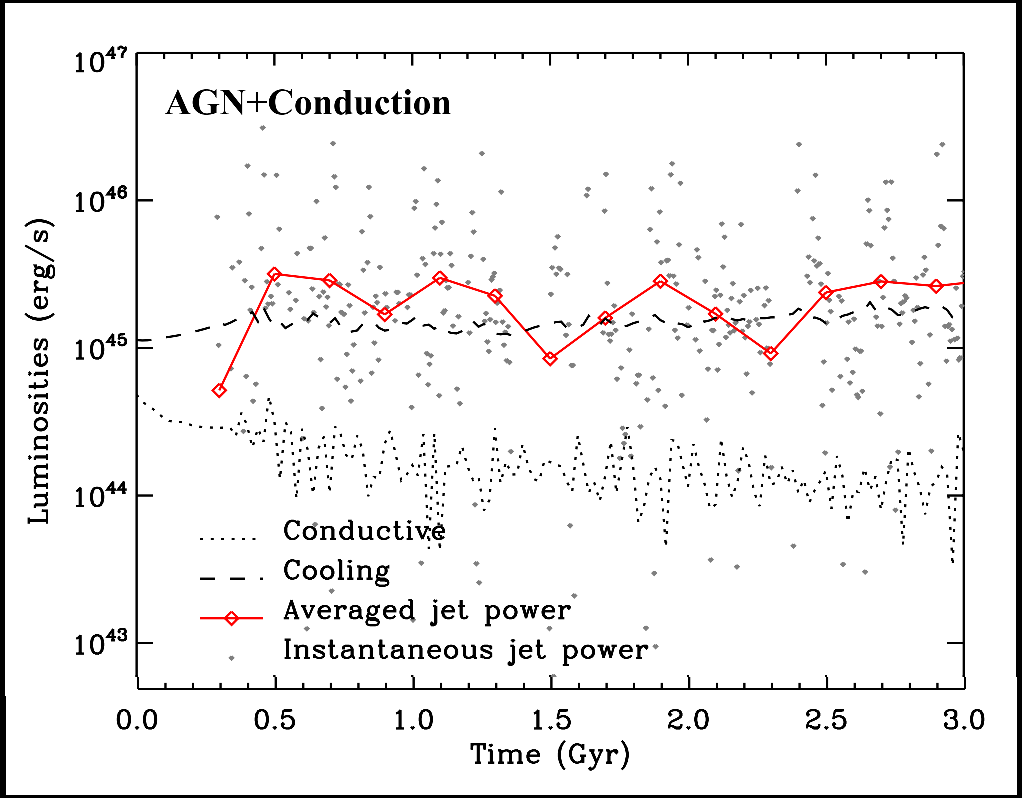


B field



(Don't use too many fancy transitions)

Conductive vs. AGN heating

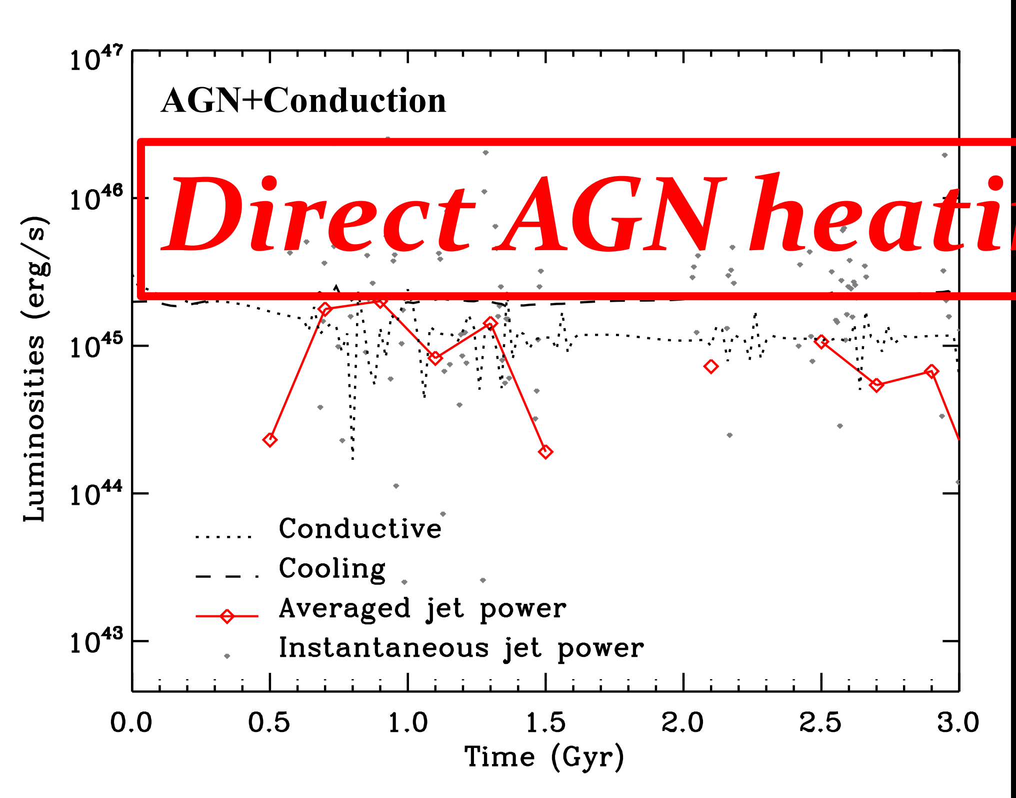


$$Q_{\rm cond} = -f_{\rm sp}\chi\partial T/\partial r$$

(Don't use too many fancy transitions)

Conductive vs. AGN heating

(2 x Perseus ~ 1.7 x 10^{15} M_{sun})



Direct AGN heating is crucial!!

(Don't use too many fancy transitions)

Conclusions

- Giving a good presentation is one of the most important skills in one's career
- Please never repeat what was done in this talk

How many common mistakes have you found?

- Apologies in the beginning
- Fillers (Uh, Um, so, 然後...)
- Reading from slides
- Back facing the audience / no eye contact
- Small font sizes
- Silent voices
- Long equations
- Unclear figures (faint lines, small labels, low contrast colors)
- Randomly pointing laser pointers
- Too many fancy animations and transitions
- Going over time & ignoring the moderator

Group Activity (4-6/grp)

Q: What are other ***do's*** and ***don'ts*** for *preparing* and *presenting* a talk?

	Preparation	Presentation
Do's	1. 2.	1. 2.
Don'ts	1. 2.	1. 2.

Tips sharing

Dr. Yi-Kuan Chiang

CCAPP Fellow, Ohio State University

Yi-Kuan's tips for effective presentations

1. Know your audience

- How much background knowledge do they have?
- What specific things they can resonate with (e.g., physics insights, awesome data…)?

2. Have a good and cohesive story to tell

3. Put extra effort in making slides

- Go back to the drawing board first
- Use each title to deliver a message
- Have good visualization
- Important messages should be delivered multiple times in different ways (***redundancy*** is needed since there is always information loss in communications)

4. Practice, practice, practice

5. Live performance

- Should not sound flat and boring

Best talk award
NEP Conference 2020

Tips sharing

Dr. Tetsuya Hashimoto

CICA Fellow, National Tsing Hua University

Please justify your project

Excellent results

+ poor reasoning

OK, then what can we learn from this project?

Audience

Poor results

+ excellent reasoning

This project may solve the key question in future

Audience

For this purpose, fill [ ] in your talk

Big Q is a big question in astronomy/physics.

Item is a key to understanding the ***Big Q***.

However, revealing ***Item*** was hampered by ***Problem*** in previous works.

I started this project because my data/idea allows us to solve the ***Problem***.

Please justify your sample

I use this data because my supervisor has it.

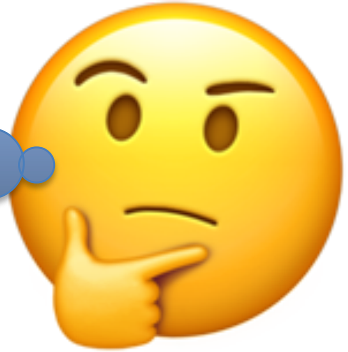
I use this data because it allows to overcome the problem.

Technical difficulty ≠ scientific impact

This analysis is very difficult!
I spent a lot of time!

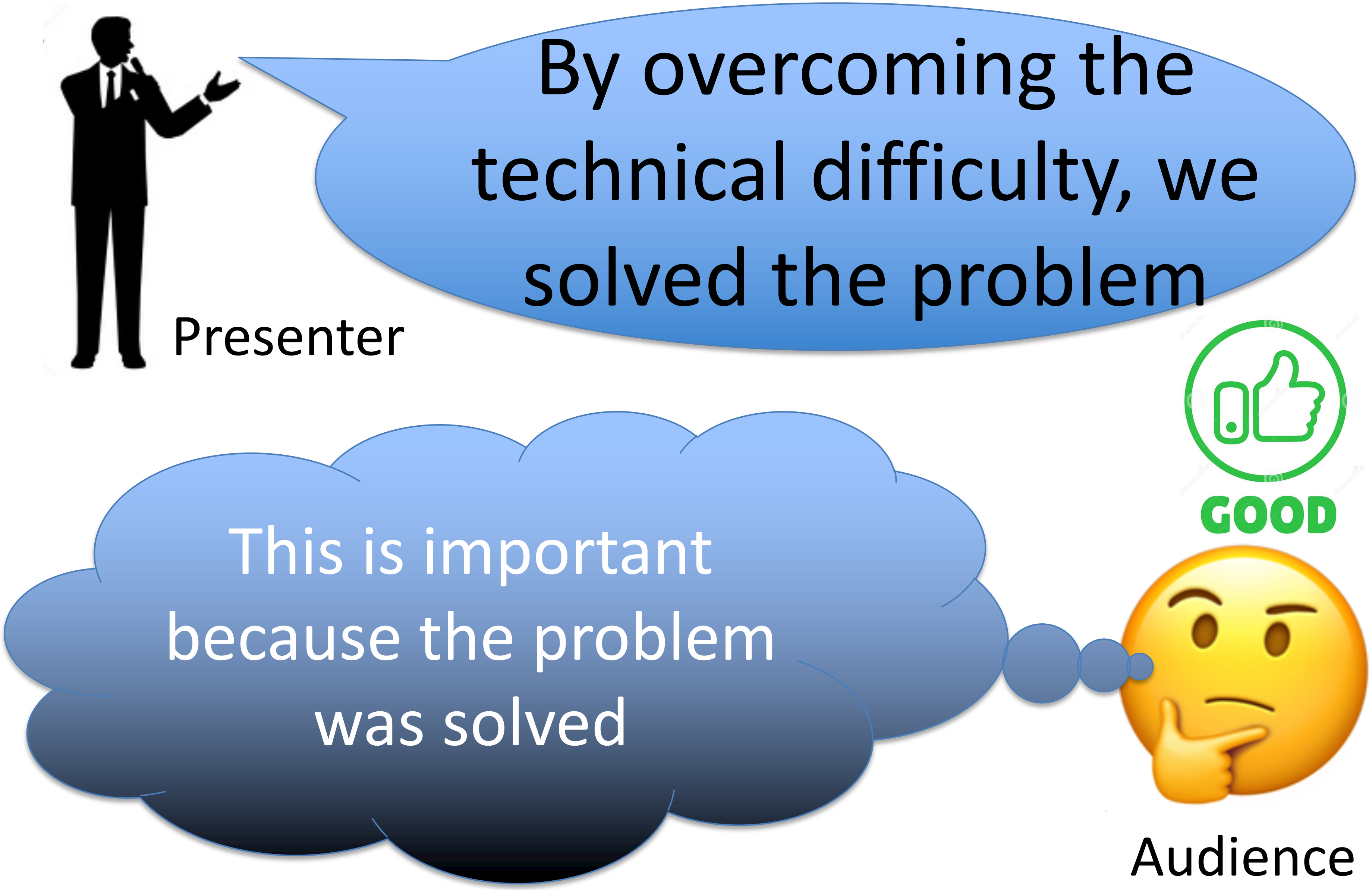
Presenter

辛苦了. Then, what is the importance of your analysis?



Audience

Technical difficulty ≠ scientific impact



One point in one slide

Audiences understood 10% of many points in the slide

Audiences understood 100% of one point in the slide

Final tips

- Invisible font/color/figure/label/unit

--> all give a negative impression

- Please practice many times

Tips sharing

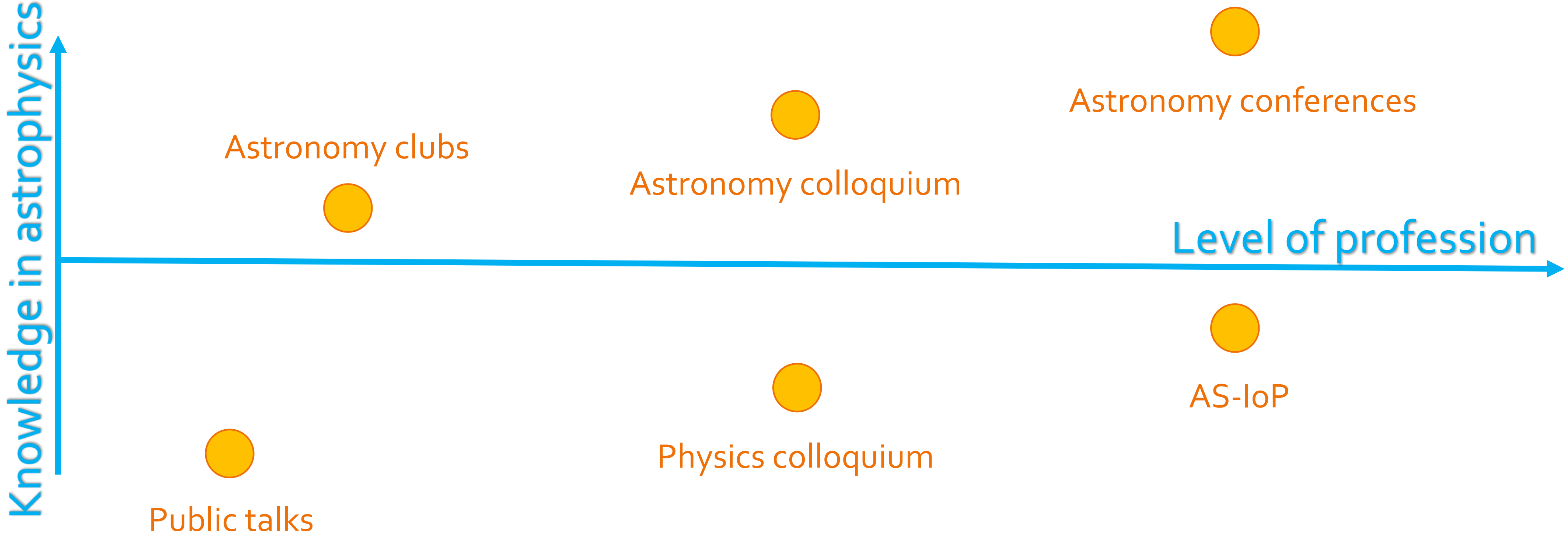
Karen Yang

National Tsing Hua University

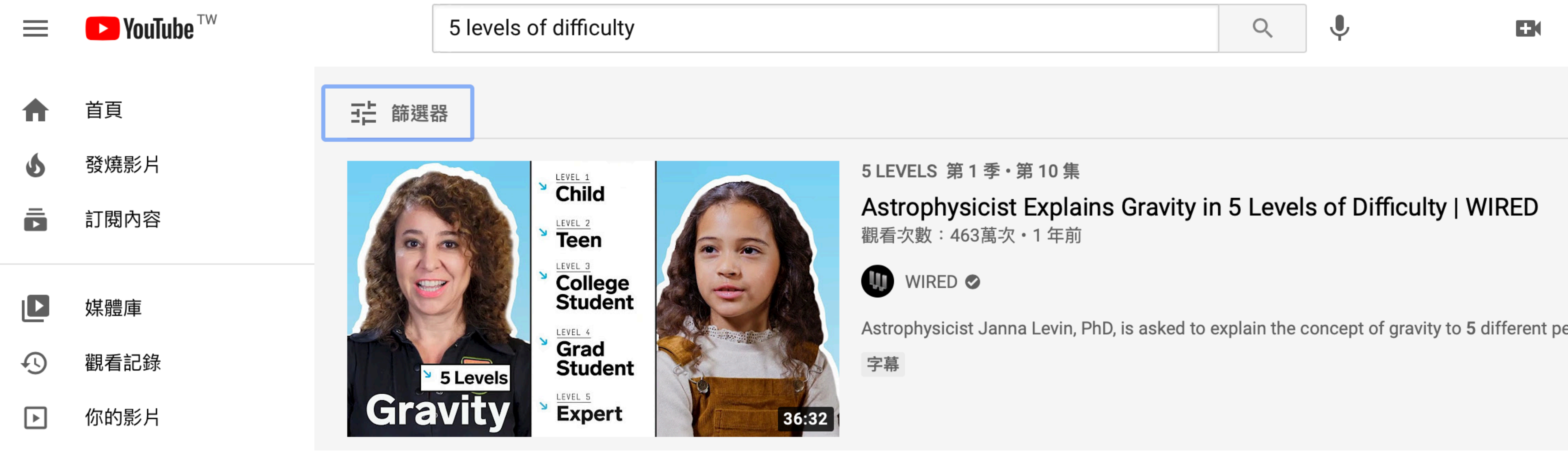
"It's not about how much you emit,
but how much they absorb."

-- by K. Yang

Know your audience!



Know your audience!



Ask yourself: "What is the <u>purpose</u> of my talk?"

- Promote and advertise research results
- Establish collaborations
- Obtain a degree
- Get a job
- Let people know me and like me
- Get funding/donation
- Educate the audience
- Entertain the audience
- ……

"Practice makes perfect."

60-min rule

"Practice makes perfect."

Learn from others' talks

Group Sharing & Free Discussions

Q: What are other ***do's*** and ***don'ts*** for *preparing* and *presenting* a talk?

	Preparation	Presentation
Do's	1. 2.	1. 2.
Don'ts	1. 2.	1. 2.

https://www.youtube.com/watch?v=jnWyzdUGmyE

How to give a great talk. Watch this, your talk will immediately become attractive!

	Preparation	Presentation
Do's	1. Dedicate enough time to prepare 2. Make figures clear 3. Check the slides (whether the content is logic, grammar is correct, length of text is appropriate) 4. Have a summary slide on the key points 5. Think about what questions the audience may ask and make backup slides 6. Practice 7. Choose comfortable and presentable attire 8. Turn off FB/email notifications 9. Check battery, pointer, videos/audios, prepare backups on a USB stick or on the cloud	1. Speak loud and clear with moderate speed 2. Explain the figures/plots/tables 3. Repeat important concepts and key messages multiple times 4. Make eye contact 5. (Try to) Show confidence 6. Be positive and be honest 7. Tell a joke when appropriate
Don'ts	1. Use unreadable font style 2. Put too many stuff on one slide 3. Put too many slides but no able to finish them 4. Put something you don't know 5. Stay up late 6. Drink too much tea/coffee/alcohol or go to a party 7. Choose noon to do the presentation, if possible	1. Panic 2. Face to the screen and talk to oneself 3. Read the slides 4. Talk in monotone 5. Move too excessively 6. Go overtime 7. Ignore the audience's question or pretend to know the question 8. Relax before the end of the talk (including Q&A)