



# 16. Weak signals

**Reviewer:**

Team Romania -  
Limitless

**Opponent:**

Team New Zealand

**Reporter:**

Team Bulgaria

# Task of the problem

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Controlling **signal-to-noise ratio** is important in many measurements to distinguish a meaningful signal from **statistical fluke**. Propose a problem requiring experiments to detect **very weak signals**.

## Proposed problem:

Make an investigation, based on data with a **low signal-to-noise ratio** to explore a distant **Space object**.

Theoretical part

Great explanation of experimental part, clear results

# Reporter summary



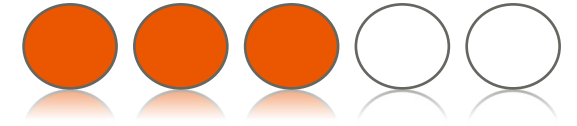
## Strong points

- Theoretical model well constructed on the astronomical background
- Detailed experimental setup (telescope + used softwares)
- Great link between the theoretical model and the experimental results
- Great analyzes of weak signals in the experimental part
- Reporter drew clear conclusions and drew clear hypothesis-result ties.
- Complete answers to the opponent's questions

## Weak points

- Concerned too much on the information about the astronomy in the theoretical part.
- Theory about weak signals, statistical flukes, SNR is completely missing
- Differences between meaningful weak signals and statistical flukes is missing (important part of the task).
- The way of control of SNR in the experimental part is not presented

# Opponent summary



## Strong points

- Observed that the key words definition are missing
- Noticed the fact that statement asks for collected data, not produced data
- Observed that the task of the problem is not clearly achieved
- Relevant questions about the environmental setup

## Weak points

- Didn't observe the fact that theoretical information about weak signals, statistical flukes, SNR is completely missing
- Asked too many questions about facts that we believe were sufficiently explained by the reporter. - didn't concern on the fact that the reported had a huge theoretical gap
- Task of the problem asks us to determine the difference between meaningful signals and statistical flukes, no concern from the opponent

# Clashes during the fight

- O: Accuracy of telescope  
R: Explained parameters of the environment and of the telescope  
We: Clear answer from the reporter
- O: How do you define statistical fluke?  
R: Complete answer for his study  
We: Agree with the answer, but we suggest a general definition for statistical flukes would have been great in theory
- O: How did you minimize the unwanted noise?  
R: Answered clearly, explaining the properties of the environment.  
We: Good question posed by the opponent, good answer by the reporter.
- O: Lack of bulge definition important?  
R: Lack of boundary, not definition.  
We: Good answer by reporter.