

# 科技寫作(Scientific Writing)



Week 11 (Dec. 08 – Dec. 12)

Introduction Section

# 期末報告Requirement

1. 書面格式: ([PDF](#)) [RevTeX 4.2 Template and Sample](#)
2. 內容：
  - (i) PDF-1 : Title + Abstract
  - (ii) PDF-2 += PDF-1 + all (Sub)section Titles
  - (iii) PDF-3 += First-sentences of all paragraphs in Method Section
  - (iv) PDF-4 += PDF-3 + At least 2 Figures for experimental results (with captions and some First-sentences in the Result section).
  - (v) PDF-5 += PDF-4 + First-sentences of all paragraphs in at least one Discussion subsection.

# 期末報告Requirement (口頭15mins-年會口頭報告長度)

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(4)預期得到結果、(5)結果之預期physical implication

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報告前e-mail繳交PDF-1~5 (檔名：姓名\_ScientificWriting\_1(or2345).pdf )、  
評分會考慮是否超時(15 mins)及遲(未)到  
若針對同學的報告提問可額外加分

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論文全文：

<https://ui.adsabs.harvard.edu/abs/2024A%26A...685A..18L/abstract>

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# Introduction section

A nightmare for the supervisor. 😞

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Introduction =! 文獻回顧

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Don't be verbose!  
Otherwise, people may give up reading before they  
get to the main text!  
(no longer than 1 two-column page. Never!)



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  - (1) Appetizing
  - (2) Providing context and logic (instead of providing knowledge!)
    - (i) background
    - (ii) question
    - (iii) logic + method
    - (iv) how this paper is organized (optional)

# 論文寫作實例

## Introduction

1. 電子具有波動性？ $\lambda = h/p$
2. 雙狹縫實驗

## Method

1. 用什麼device作為屏幕
2. 如何generate具特定動量的電子束

## Results

1. 是否有對應到特定波長的干涉條紋？
2. 電子束動量熱誤差及系統性偏差？

## Discussion

呼應問題

1. (假設)電子束中的電子無交互作用。若此假設不對，是否可能在不考慮平面波干涉的情形解釋干涉條紋？

2. 干涉條紋間距與光子雙狹縫干涉理論比較，驗證(1)電子的波動性，及(2)電子動量與波長間的關係

3. 進行單電子雙狹縫干涉實驗以排除電子交互作用造成類似干涉的條文的可能性。

電子具有波動性？ $\lambda = h/p$

1. Assumption  
2. 誤差

雙狹縫實驗

有干涉條紋，  
間距為多少

無干涉條紋

有pattern但不能  
以平面波線性疊  
加解釋

干涉條紋間距與  
光子雙狹縫干涉理論比較

單電子干涉實驗

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呼應Compton scattering之敘述

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**Subject (sample):** ~~There are various kinds of massive particles, for example, proton, neutron, electron, Higgs boson, etc. Protons are ... Neutrons are ... Higgs bosons are ...~~ Electrons are electrically charged, spin-1/2 particles. Contrast to the massless photons, each electron has a rest mass of  $9.109 \times 10^{-31}$  kg. In the non-relativistic limit, Their collisions are ....[7]; in the relativistic limit, ... [8].

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Section 2 describes our instrumental setup and the performance of the devices. The results are in Section 3. We detected bright and dark bands on the screen, which appear similar to the interference pattern seen in the double-slit experiments for photons. We explicitly compared the patterns we detected with the patterns theoretically expected from the interference of electromagnetic waves at the same wavelength (Section 4) and discuss the physical implications. The conclusion is in Section 5.

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約1/4 page，略為extend後即為標準的introduction section。

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## Forming localized dust concentrations in a dust ring

### DM Tau case study

Hauyu Baobab Liu<sup>1</sup>

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Received November 25, 2025; accepted November 26, 2025

#### ABSTRACT

**Context.** Previous high-angular-resolution 225 GHz ( $\sim 1.3$  mm) continuum observations of the transitional disk DM Tau have resolved an outer ring at 20–120 au radii that is weakly azimuthally asymmetric.

**Aims.** We aim to examine dust growth and filtration in the outer ring of DM Tau.

**Methods.** We performed  $\sim 0.06$  ( $\sim 8.7$  au) resolution Karl G. Jansky Very Large Array (JVLA) 40–48 GHz ( $\sim 7$  mm; Q band) continuum observations, along with complementary observations at lower frequencies. In addition, we analyzed the archival JVLA observations undertaken since 2010.

**Results.** Intriguingly, the Q band image resolved the azimuthally highly asymmetric, knotty dust emission sources close to the inner edge of the outer ring. Fitting the 8–700 GHz spectral energy distribution (SED) with two dust components indicates that the maximum grain size ( $a_{\max}$ ) in these knotty dust emission sources is likely  $\gtrsim 300 \mu\text{m}$ , whereas it is  $\lesssim 50 \mu\text{m}$  in the rest of the ring. These results may be explained by a trapping of inwardly migrating “grown” dust close to the ring inner edge. The exact mechanism for developing the azimuthal asymmetry has not yet been identified, which may be due to planet-disk interaction that might also be responsible for the creation of the dust cavity and pressure bump. Otherwise, it may be due to the fluid instabilities and vortex formation as a result of shear motions. Finally, we remark that the asymmetries in DM Tau are difficult to diagnose from the  $\gtrsim 225$  GHz observations, owing to a high optical depth at the ring. In other words, the apparent symmetric or asymmetric morphology of the transitional disks may be related to the optical depths of those disks at the observing frequency.

**Key words.** Protoplanetary disks – Planets and satellites: formation – (ISM:) dust, extinction – Radio continuum: ISM

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7	<b>Acknowledgements.</b> The National Radio Astronomy Observatory is a facility of the National Science Foundation operated under cooperative agreement by Associated Universities, Inc. This paper makes use of the following ALMA data: ADS/JAO.ALMA #2013.1.00498.S, #2013.1.00647.S, #2015.1.00296.S, #2016.1.00565.S, #2016.1.01042.S, #2017.1.01460.S, #2018.1.01755.S, #2018.1.01756.S, #2019.1.00040.S, #2019.1.00041.S, #2019.1.00042.S, #2019.1.00043.S, #2019.1.00044.S, #2019.1.00045.S, #2019.1.00046.S, #2019.1.00047.S, #2019.1.00048.S, #2019.1.00049.S, #2019.1.00050.S, #2019.1.00051.S, #2019.1.00052.S, #2019.1.00053.S, #2019.1.00054.S, #2019.1.00055.S, #2019.1.00056.S, #2019.1.00057.S, #2019.1.00058.S, #2019.1.00059.S, #2019.1.00060.S, #2019.1.00061.S, #2019.1.00062.S, #2019.1.00063.S, #2019.1.00064.S, #2019.1.00065.S, #2019.1.00066.S, #2019.1.00067.S, #2019.1.00068.S, #2019.1.00069.S, #2019.1.00070.S, #2019.1.00071.S, #2019.1.00072.S, #2019.1.00073.S, #2019.1.00074.S, #2019.1.00075.S, #2019.1.00076.S, #2019.1.00077.S, #2019.1.00078.S, #2019.1.00079.S, #2019.1.00080.S, #2019.1.00081.S, #2019.1.00082.S, #2019.1.00083.S, #2019.1.00084.S, #2019.1.00085.S, #2019.1.00086.S, 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