Xiangyu **Wu**

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Education

CUGB (China University of Geosciences, Beijing)

Beijing, China

M.S. in Geophysics – Space Physics

Sep. 2020 - Now

- Average score: 91.3/100.0
- Main courses: Numerical Analysis / Geophysical Information Processing / Progress in Space Physics / Scientific Paper Writing / Theory of Geophysical Inversion / Progress in Geophysics / Machine Learning

UAH (The University of Alabama in Huntsville)

Huntsville, USA

Non-Degree Student in Geophysics – Space Physics

Jan. 2020 - Jun. 2020

- GPA: 4.0/4.0
- Main courses: Thermal and Statistical Physics / Physics Practicum / Intro to C Programming / English for Academic Purposes Program

CUGB (China University of Geosciences, Beijing)

Beijing, China

B.S. in Geophysics

Sep. 2016 - Jun. 2020

- GPA: 3.73/4.0
- Average score: 90.34/100.0
- Rank: 2/26
- Main courses: Higher Mathematics / Linear Algebra / College Physics / Probability and Statistics / Complex Variable Function and Integral Transform / Mathematical Physical Equation / Digital Signal Processing / Calculation Methods in Geophysics / Space Physics / Geomagnetism / Geoelectrics / Computer Language Programming / MATLAB Programming and Application / Mathematical Modeling

Research Experience

School of Geophysics and Information Technology, CUGB

Beijing, China

Statistical Study of Release Time and Its Energy Dependence of In Situ Energetic Electrons

Oct. 2021 - Now

- *Based on our previous works, We performed a statistical study of the release time and its energy dependence of energetic electrons in 29 impulsive SEE events (2002 - 2016). In situ and remote hard X-ray observations are from the Wind and the RHESSI and/or Fermi spacecraft, respectively.*
- *Our results suggest, for all events, the delay between upward- and downward-propagating near-relativistic electrons is distinct, mainly distributed between 0-1000 s. 26 of the 29 events($\sim 90\%$) show clear energy-dependent release for outward electrons, and only 3 events($\sim 10\%$) have outward electrons of different energies released within 1 minute, showing no energy dependence according to our criteria.*
- *We also discussed the implication of the energy-dependent release on the MHD turbulence property at the acceleration site.*
- *One paper was submitted to JGR: Space Physics [1].* ***Keywords:*** *SEPs, Particle acceleration, Solar flares, Turbulence*
- ***My contribution:*** *Look for jointly observed events, Data Processing(In-situ electrons, FVDA method, HXR, Fitting), Plot the figures, Writing.*

School of Geophysics and Information Technology, CUGB

Beijing, China

Constraints on the Electron Acceleration Process in Solar Flare: A Case Study

Feb. 2021 - Sep. 2021

- *We examined the release times of energetic electrons in an impulsive event on 2016-07-23. The releases of in situ energetic electrons from the Sun were delayed from those downward, derived from the recently developed Fractional Velocity Dispersion Analysis (FVDA).*
- *Furthermore, the release time of in situ electrons was a function of electron energy. Assuming the acceleration mechanism for the upward-propagating electrons is of Fermi-type and controlled by an energy-dependent diffusion coefficient, we fitted in situ electron release times by a simple functional form, related to turbulence spectral index.*
- *We proposed a procedure to probe the MHD turbulence spectrum in flare sites from in situ electron observations. The possible solar flare scenario of this event was also discussed.*
- *One paper was published on Geophysical Research Letters [2].* ***Keywords:*** *Particle acceleration, SEPs, Solar flares, Turbulence*
- ***My contribution:*** *Data processing & Analysis(In-situ electrons, FVDA method, HXR, Type III radio burst), Plot the figures.*

The Center for Space Plasma and Aeronomic Research (CSPAR), UAH

Huntsville, USA

Outward-Propagating and Mirroring of the Same Energetic Electrons

Apr. 2020 - Nov. 2020

- *We reported an energetic electron event occurred on 2012-09-27. Wind/3DP observed two episodes of energetic electrons within 1 hour: one being impulsive and propagating away from the Sun, and the other slightly gradual and back toward the Sun.*
- *Applying the recently developed Fractional Velocity Dispersion Analysis (FVDA) to both episodes, we found the impulsive one had a shorter path length, and the slightly gradual one was almost twice as long. Interestingly, the inferred release times for both populations were the same, within uncertainty.*
- *We suggested the second time observation was due to reflection beyond 1 au. The possible magnetic field configuration was also discussed.*
- *One paper was published on The Astrophysical Journal Letters [3].* ***Keywords:*** *SEPs, Interplanetary magnetic fields, Solar coronal mass ejection shocks, CME*
- ***My contribution:*** *Data processing & Analysis(In-situ electrons, FVDA method, SXR & HXR), Plot the figures.*

The Center for Space Plasma and Aeronomic Research (CSPAR), UAH *Huntsville, USA*

Identification of Two Electron Populations in An Impulsive SEE Event *Jan. 2020 - May. 2020*

- *We examined the release times of energetic electrons in an impulsive Solar Energetic Electron(SEE) event occurred on 2001 April 25.*
- *The hard X-ray(HXR) observation times from Yohkoh are used as a proxy for the release time of downward-propagating electrons, and the release time of outward-propagating electrons is obtained from Wind in situ electrons($>\sim 25keV$) observation, using Fractional Velocity Dispersion Analysis(FVDA) method.*
- *We found the release times of in situ electrons were clearly delayed from those downward, and discussed the implication of this delay on the electron acceleration and trapping process.*
- *One paper was published on The Astrophysical Journal Letters [4].* ***Keywords:*** *SEPs, Solar flares, Solar magnetic reconnection*
- ***My contribution:*** *Process GOES/SXR data, Plot synoptic figures(Fig.1 & Fig.2), Practice using the FVDA method.*

Publications & Conferences

Publications

[1] **Xiangyu Wu**, Gang Li, Lulu Zhao, Frederic Effenberger, Linghua Wang, Shuo Yao. Statistical study of release time and its energy dependence of in-situ energetic electrons in impulsive solar flares[J]. Submitted to *JGR: Space Physics*. **Under Review**.

[2] Gang Li, **Xiangyu Wu**, Frederic Effenberger, Lulu Zhao, S. Lesage, N. Bian, L. Wang. Constraints on the Electron Acceleration Process in Solar Flare: A Case Study. *Geophysical Research Letters, 48*, e2021GL095138. **Published**.

[3] Gang Li, **Xiangyu Wu**, Lulu Zhao, Shuo Yao. Observations of Outward-propagating and Mirroring of the Same Energetic Electrons by Wind. *APJL*, 905, L1. **Published**.

[4] Gang Li, Lulu Zhao, Linghua Wang, Wei Liu, **Xiangyu Wu**. Identification of Two Distinct Electron Populations in an Impulsive Solar Energetic Electron Event. *APJL*, 900, L16. **Published**.

Conferences

[1] **Xiangyu Wu**, Gang Li, Shuo Yao. A Statistical study of the release time difference between upward and downward propagating energetic electrons in impulsive SEP event. *44th COSPAR Scientific Assembly*, 2022-July-19, D1.6-0030-22.

[2] **Xiangyu Wu**, Gang Li, Shuo Yao, et al. A Study on Electron Energy-dependent Release in Solar Energetic Electron Events. *19th AOGS Annual Meeting*, 2022-Aug-01, ST01-A025.

[3] **Xiangyu Wu**, Gang Li, Lulu Zhao, et al. Application of Fractional Velocity Dispersion Analysis to Solar Energetic Electron events. *3rd Advanced Space-based Solar Observatory(ASO-S) Scientific Assembly*, 2020-Nov-26.

Awards & Honors

Awards

2019	**Honorable Mention**, the COMAP's Mathematical Contest in Modeling, USA	*Beijing, China*
2018	**First prize in Beijing**, Contemporary Undergraduate Mathematical Contest in Modeling	*Beijing, China*
2018	**Second prize in School-level**, the 13th Physics Experiment Competition	*Beijing, China*

Honors

2019	**National Student Innovation and Entrepreneurship Outstanding Project**, CUGB	*Beijing, China*
2019	**Outstanding Student in Innovation Class of CUGB**, China University of Geosciences	*Beijing, China*
2018	**Third Prize for Excellent Team in Summer Volunteering Activities**, China University of Geosciences	*Beijing, China*

Skills, Certifications & Others

Languages: Chinese (Native) & English (IELTS 6.5)

Programming language: Python | Matlab | C++ | Java

Software: sswIDL | LaTex | Photoshop | Lightroom

Interests: Photography | Drawing.