Fermi Summer School 2021

The Fermi Mission will hold a virtual summer workshop series of interactive activities to learn about Fermi data analysis and lectures on gamma-ray astrophysics. The virtual school will consist of weekly online workshops and lecture presentations. These will be held on Mondays from June 7th to July 26th with the exception of July 5th. Lectures will be held on Mondays from 11 am to 12 pm (Eastern US, GMT-4) and analysis tutorial live sessions will be held on Mondays from 2-3:30 pm.

The material is designed for graduate students and early postdocs starting analysis projects in gamma-ray astrophysics that involve Fermi data and science. In addition to standard analysis using the Fermitools, we will include sessions covering pulsar analysis with the Large Area Telescope and gamma-ray burst analysis with the Gamma-ray Burst Monitor. We are seeking attendees that are interested in engaging in analysis activities and interacting with instructors and the other students in group activities. There will be no registration fee, but if demand is high, we may need to limit attendance and prioritize students who are developing near-term research projects using Fermi data.

Schedule for Summer 2021

Times are in Eastern Daylight Time (UTC04:00).

Technical Help Sessions

We will have two sessions via Teams the week before the start of the workshops to help people get setup with the tools. Please try to install the FermiBottle Docker Container, which contains all the software needed for the workshops and go through the Summer School Checklist to make sure the container is functioning correctly.

	Thursday, June 3	**Friday, June 4**
10am-11am	Tech Help Session	Tech Help Session

June 2021

	Mon, June 7	**Mon, June 14**	**Mon, June 21**	**Mon, June 28**
Lectures **11 am - 12 pm EDT**	Welcome Notes Intro to Fermi and the Fermi Sky Liz Hays & Judy Racusin	AGN Observations Manel Errando Reading and questions for **before** the lecture Welcome Notes Lecture Slides	Statistics for Astrophysics Daniela Huppenkothen Bayesian Statistics and Modeling Introduction to the the Concept of Likelihood and Its Applications Data Analysis Recipes: Probability Calculus for Inference	Particle Acceleration Yajie Yuan Excerpt from *High Energy Astrophysics* by Longair Lecture Slides
Intermission	Gather	Gather	Gather	Gather
Analysis Tutorials **2 pm - 3:30 pm EDT**	Getting started with Fermi Analysis Joe Eggen Data Exploration Tutorial Video Data Exploration Notebook Data Quicklook Notebook TXS 0506+056 Notebook Q&A from the tutorial session	First steps with fermipy Liz+ Welcome Notes and Group Exercise Setup instructions for fermipy tutorial notebook Slido Q&A from the tutorial session	Notes on LAT likelihood and a statistical exercise Liz/Daniela Fermi Summer School 2021 Tutorial 3 Instructions Welcome Slides Notes on Likelihood in LAT Google Form (Sign up for a source/topic project) Slido Q&A from the tutorial session	Light Curves Liz/Sara Buson Light Curve examples for group exercise Notes on Light Curves Slido Q&A from tutorial session

July 2021

	Mon, July 12	**Mon, July 19**	**Mon, July 26**

Lectures 11 am - 12 pm EDT	The Galactic Center Mattia Di Mauro Previously recorded talk on the Galactic Center	Ground-based Gamma-ray Observations Marcos Santander Ground-based gamma-ray astronomy (introductory review) - G. Di Sciascio (2019) TeV Source Catalog (TeVCat) A couple recent highlight results and references: - PeV gamma rays from the Crab Nebula. https://science.sciencemag.org/content/early/2021/07/13/science.abg5137 - GRB detections in the VHE range: https://arxiv.org/abs/2006.07249, https://arxiv.org/abs/2106.02510 - CTA Science Book: https://arxiv.org/abs/1709.07997	Wrap up and Next Steps + Group Photo Student Spotlight Presentations “Fermi-LAT Analysis of TeV PWN” – Jooyun Woo “Spectral and Temporal Analysis of GRB210410A detected by Fermi-LAT/GBM” – DJ Maheso "Searching for High-Energy Neutrinos from Magnetars with IceCube" – Ava Ghadimi
Intermission	Gather	Gather	Gather
Analysis Tutorials 2 pm - 3:30 pm EDT	Pulsar tutorial Matthew Kerr Slido Q&A from the tutorial session	GBM Data Tools Adam Goldstein+ Using the GBM Tools video tutorial GBM Data Tools Documentation and Notebooks Slido Q&A from the tutorial session	Diagnostics and refining models Sign up for follow-up office hours Please fill out the Survey so that we have some feedback for future events. Slido Q&A from the tutorial session

Office hours will be held on Gather with various team members throughout the summer.

Office Hours	Date/Time (EDT)	Host	Topics
Week 1	Thurs. Jun 10 10-11 am	SSC Members, Liz, Judy	Tech Support, Fermitools, Fermi Mission
Week 2	Wed. Jun 16 2-3 pm	Jeremy Perkins	Fermipy, python scripting
Week 2	Thurs. Jun 17 10-11 am	SSC Members	Help desk
Week 3	Wed. Jun 23 2-3 pm	Jeremy Perkins	Fermipy, python scripting
Week 3	Thurs. Jun 24 10-11 am	SSC Members	Help desk
Week 4	Thurs. Jul 1 10-11 am	SSC Members	Help desk
Week 5	Thurs. Jul 15 10-11 am	SSC Members	Help desk
Week 6	Thurs. Jul 22 10-11 am	SSC Members	Help desk
Week 7	Thurs. Jul 29 10-11 am	SSC Members	Help desk

Tools

- The meeting platform is Microsoft Teams. Non-NASA guests can join meetings. You will need to wait in the lobby until you are admitted by the meeting moderators.
- The software necessary for the tutorials (such as the Fermitools) are distributed in the FermiBottle Docker Container, a fully-functional, self-contained analysis environment. Please go through the Summer School Checklist to make sure the container is functioning correctly.
- Slido will be used for polling and questions. There will be a code for each lecture and tutorial session.
- Primary announcements will be sent out via an e-mail list.
- Secondary announcements, interaction between sessions. instructor-student, and student-student communication will be handled via Slack. Instructions on joining the Summer School Slack will be sent to attendees by e-mail.
- This confluence page will be the home for the schedule as well as the presentation and supporting materials.

Supporting Material

- There are a number of video tutorials for Fermi data analysis already available. You can also find tutorials posted on the SSC web page Data Analysis area.

Interesting repositories for Fermi analysis

- fermiPy

- https://github.com/rsnemmen