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121004	FRANCESCO	MASSARO	HUNTING GAMMA-RAY BLAZARS WITH OPTICAL SPECTROSCOPIC OBSERVATIONS	One of the main scientific objectives of the Fermi-NOAO Cooperative Arrangement is: studying candidate counterparts, including redshift determination of previously unknown BL Lacs and high-redshift blazars. We propose to extend our optical spectroscopic campaign, already approved in Fermi Cycle 6, 9, 10 and 11 to reveal the nature of all blazar candidates of uncertain type (BCUs) and all blazar-like objects, potential counterparts of the unidentified gamma-ray sources (UGSs) selected according to our methods based on the IR colors, out of the 4FGL. Our legacy project is crucial to prepare the future releases of Fermi source catalogs and to improve our knowledge of the blazar population.
121006	CHI (TEDDY)	CHEUNG	PROMPT FOLLOW-UP OF FLARING/TRANSIENT FERMI-LAT GALACTIC PLANE SOURCES	We propose a systematic search and follow-up program of flaring/transient Fermi-LAT Galactic plane gamma-ray sources. Essential to this effort are the VLA observations requested here. At high-significance (≥ 5 sigma), we expect up to ~ 2 all-sky events/year, with $\sim 2/3$ visible with the VLA, thus request a single ToO. Together with pre-approved Swift XRT/UVOT observations, we aim to identify plausible radio, X-ray, and optical counterparts following the LAT event via expected correlated variability. In case a plausible VLA counterpart is identified, we will obtain further radio follow-up with our OVRO and LWA1 partners. After the successful discovery of novae as a class of GeV emitters, these coordinated observations will enable us to uncover even rarer types of Galactic gamma-ray transients.
121014	IAN	CHRISTIE	NEUTRINOS AND GAMMA-RAYS FROM MAGNETIC RECONNECTION IN BLAZARS	The detection of a high-energy neutrino coincident with the flaring Fermi blazar TXS 0506+056 provides the first evidence for the presence of relativistic hadrons in blazar jets. Thus, understanding how these cosmic accelerators work becomes more relevant than ever. Magnetic reconnection is a viable particle acceleration mechanism in jets as it can explain many aspects of blazar emission. However, there is no robust prediction for the neutrino emission from reconnection. We propose to develop a lepto-hadronic blazar model by coupling large-scale simulations of reconnection in electron-proton plasmas with a radiative code that includes all relevant hadronic processes. With the proposed model, we will compute from first principles the multi-messenger emission from reconnection in blazar jets.

121023	PETER	JENKE	STUDIES OF ACCRETING BINARY PULSARS WITH THE FERMI GAMMA-RAY BURST MONITOR IN CYCLE 12.	Since Cycle 1 we have been continuously monitoring the full sky with Fermi GBM for pulsars with spin frequencies in the 1 mHz to 16 Hz (since Cycle 7). We conduct daily blind searches to discover previously unknown or quiescent pulsars. We are providing, through our website and ATels, quick-look estimates of pulsed flux and frequency for use in multi-wavelength observations. We propose, for Cycle 12, to add an online query tool so that the community may customize pulsed searches for any source regardless of whether we are currently monitoring it. The tool would allow users to adjust important parameter such as integration time and energy range in which the search is performed. With this tool, we will make energy resolved pulsed profiles for any detected source available to the public.
121030	OLIVIER	HERVET	PROBING THE LOCATION OF THE GAMMA-RAY EMISSION ZONES IN THE BL LAC MRK 421: A SCENARIO OF RECOLLIMATION SHOCKS	The multiple stationary knots commonly observed with VLBI in high-frequency-peaked BL Lac objects (HBLs) can be interpreted as multiple recollimation shocks accelerating particles along jets. If so, a unique pattern of the variability should appear after each strong flare from a gamma-ray bright HBL such as Mrk 421. A recent investigation shows evidence of such a pattern at >3 sigma significance in X-rays. We propose a careful analysis of the complete Fermi-LAT data set on one-day timescales to look for a similar pattern in the gamma-ray data. Radio observations with the VLBA at 15.3 GHz are also requested to monitor any change of the knotty structure of Mrk 421 which could affect the proposed study.
121031	STEPHEN	CENKO	THE ENERGETICS AND ENVIRONMENTS OF FERMI-LAT GRBS	We propose here to continue our successful program to provide complementary multi-wavelength observations of well-localized gamma-ray bursts (GRBs) detected by the Fermi Large Area Telescope. Specifically, our program is designed to 1) identify long-wavelength (optical, X-ray, and radio) counterparts, 2) obtain spectroscopic redshifts, and 3) measure beaming-corrected energies (burst plus afterglow) of Fermi-LAT GRBs. This study will provide us with new insights into the least understood aspect of GRBs -- the central engines -- by constraining the maximum energy available for progenitor models (e.g., magnetars and black holes).

121035	SLAVKO	BOGDANOV	AN ATCA SURVEY FOR TRANSITIONAL MILLISECOND PULSARS IN UNASSOCIATED FERMI LAT SOURCES	<p>Three neutron star systems have now been observed to switch between accretion- powered and radio millisecond pulsar (MSP) states. Fermi LAT revealed that these so-called transitional MSPs emit gamma-rays even during their accreting states. At the same time, highly-variable flat-spectrum radio emission is seen. This observational feature offers a particularly promising approach towards identifying new accreting MSPs. We request support for our completed pilot survey with ATCA at 5.5/9 GHz, augmented by near-simultaneous Swift data, of 20 4FGL sources that are strong accreting MSP candidates. Extending the presently limited sample has important implications for accretion processes and jet formation physics, and potentially the nature of the puzzling Galactic center gamma-ray excess.</p>
121041	ERIC	CHARLES	SUPPORTING FERMI-LAT SCIENCE WITH PUBLICLY AVAILABLE SOFTWARE	<p>One important factor contributing to the success of the mission has been high-quality publicly available software to analyze Fermi-LAT data, in particular the fermitools and fermipy software packages. This proposal has two main objectives. (i) To secure funding to finish and deploy a small set of the ongoing developments to these packages that will substantially improve the Fermi-LAT data analysis. (ii) To secure funding to support continued development and maintenance of both packages.</p>
121046	FRANK	SCHINZEL	STEEP SPECTRUM RADIO SOURCES TOWARD FERMI UNASSOCIATED FIELDS	<p>We propose to observe with the VLA 46 Fermi/4FGL unassociated sources that are classified as pulsar-like based on their gamma-ray properties. We will apply an image-based method that uses two radio criteria: compactness and spectral index, in order to identify promising pulsar candidates for follow-up pulsation searches. This method has recently been used with great success to discover eight pulsars toward both the Fermi unassociated sources and the GeV excess toward the galactic center and discovered the pulsar wind nebula associated with one of the highest velocity pulsars known. This method selects candidates without regard to pulsar period, dispersion measure, orbital parameters, and interstellar scattering and is free of the selection biases that are in current pulsation searches.</p>

121047	JULIA	DENEVA	ELEVEN STEEP-SPECTRUM MILLISECOND PULSAR CANDIDATES IN THE GALACTIC CENTER BULGE	<p>A large population of millisecond pulsars (MSPs) is a leading contender for the source of the Fermi GeV gamma-ray emission excess (GRE) towards the Galactic bulge. As recently verified by the exciting detection of a new MSP towards the Galactic center (GC), compact ($<1''$), steep spectrum radio sources are excellent MSP tracers. We propose pulsation searches of 11 GC MSP candidates. Eight sources are in Fermi unidentified sources with pulsar-like gamma-ray spectra. They were selected via targeted VLA imaging and radio spectrum measurements. The remaining 3 sources were selected based on images and spectra from archival radio surveys. If successful, this proposal will greatly strengthen the MSP GRE origin hypothesis and illuminate a succinct path to expanding the known bulge MSP population.</p>
121054	MATTHEW	LISTER	MOJAVE: PROBING ACCELERATION, MAGNETIC FIELD EVOLUTION AND GAMMA-RAY EMISSION IN AGN JETS (Large Project)	<p>We propose to analyze data from a two-year VLBA study that will expand the scientific return of the MOJAVE program, via 15+22+43 GHz full polarization monthly imaging of 25 radio loud blazars, and bimonthly 15 GHz imaging of a pool of 68 gamma-ray flaring and accelerating AGN jets. This represents the first large scale high resolution multi-epoch study of rotation measure and spectral gradients in AGN jets, and will allow us to examine the connections between the evolution of pc-scale magnetic field structure and gamma-ray emission. Our study will lead to new insight into the pc-scale acceleration and collimation of relativistic outflows, which are vital for understanding the duty cycles of AGN jets and their resulting impact on gamma-ray activity and feedback mechanisms.</p>
121057	ADAM	GOLDSTEIN	THE GBM DATA TOOLS: A PUBLIC API TO ANALYZE AND VISUALIZE GBM DATA	<p>The Fermi Gamma-ray Burst Monitor (GBM), with its broad energy range and instantaneous coverage of 2/3 of the sky, observes a wide variety of flaring or transient phenomena with fine time and energy resolution. While the GBM team delivers data for onboard transient triggers and continuous data, there are few official tools for working with GBM data. The GBM team provides spectroscopy software for triggered GRBs, but there is also a need for tools to analyze and reduce continuous and non-triggered GBM data. We propose to develop and deliver a documented API consisting of a set of open source tools in Python for the analysis and visualization of GBM data, an analog to the Fermi GI-funded Fermipy tools developed for the Fermi LAT.</p>

121065	JULIA	DENEVA	TIMING NEW FERMI PULSARS	<p>The discovery of millisecond pulsars (MSPs) in radio searches of Fermi unidentified sources continues apace. In order to fulfill the promise of these discoveries, we must obtain phase-coherent rotational ephemerides over at least one year. These are then used to detect gamma-ray pulsations, the starting point for subsequent studies. We propose to use the GBT to time five MSPs we recently discovered in Fermi unidentified sources. Our work will contribute to the Third Fermi Pulsar Catalog, magnetospheric geometry studies and multi-wavelength pulsar emission models, and evaluating the MSPs for inclusion in pulsar timing arrays for the detection of gravitational waves.</p>
121066	MATTHEW	BARING	BENCHMARKING MULTI-MESSENGER SIGNALS FROM SHOCK ACCELERATION IN BLAZAR JETS	<p>Blazar science has been profoundly refined in the Fermi-LAT era, enhanced by numerous multi-wavelength (MW) campaigns. The recent major discovery by IceCube of high energy neutrinos from TXS 0506+056 coincident with LAT observations of strong activity in GeV photons has renewed interest in hadronic models. This project explores the problem of coupled proton and electron acceleration in relativistic jet shocks in blazars. It will employ PIC plasma simulations of diffusive and electrodynamic shock acceleration to derive non-thermal e/p abundance ratios. Using hadronic extensions of our ongoing time-dependent MW modeling of select blazars such as 3C 279, it will define benchmarks for relative fluxes in leptonic, hadronic and neutrino emission for blazars including TXS 0506+056.</p>
121068	RAFFAELLA	MARGUTTI	MAPPING EXTREME MASS LOSS FROM MASSIVE STARS WITH FERMI AND THE VLA	<p>Building on the GeV detection of SN iPTF14hls at $d=150$ Mpc, we propose a systematic search for GeV emission from nearby ($d<150$ Mpc) SN shocks interacting with a dense environment. GeV emission is predicted to originate as the SN ejecta crash into dense shells of material previously ejected by the progenitor star. We capitalize on Fermi/LAT and VLA observations with three goals: (i) Test the supernova shock breakout through a dense wind model using GeV observations. (ii) Constrain the cosmic rays acceleration at shocks formed by the collision between the SN ejecta and the CSM shell. (iii) Deliver the first predictions of the neutrino emission associated to ordinary interacting SNe and super-luminous SNe. This study opens up a new window of investigation on the most extreme mass-loss</p>

121071	THOMAS	LOREDO	GRB PULSE DECOMPOSITION USING BAYESIAN DROPLETS	<p>We propose to develop a tool suite for pulse decomposition of GBM GRB data, implementing new statistical and computational approaches that can significantly improve the fidelity and robustness of GRB pulse decompositions. New components of our approach include: (1) A discrepancy function in the signal model, guarding against introduction of spurious extra pulses due to pulse model misspecification; (2) A new model exploration algorithm--parallel thinning--that can efficiently explore the complicated parameter spaces of multi-pulse models. The main deliverables will include open-source Python code, a paper describing the algorithms and implementation with example decompositions of a sample of GRBs, and documentation including tutorial code reproducing the published examples.</p>
121074	QI	FENG	EXPLORING THE CONNECTION BETWEEN SUPERLUMINAL JET COMPONENTS AND GAMMA-RAY FLARES IN TEV BLAZARS	<p>This proposal aims at catching a series of gamma-ray flares associated with a superluminal radio knot. We propose a formal, coordinated target-of-opportunity observation program between VLBA, Fermi, and VERITAS after a bright gamma-ray flare from a known TeV IBL/LBL/FSRQ, with an increased VLBA observing cadence to sufficiently trace a superluminal knot between the core and adjacent quasi-stationary knots, and follow-up VERITAS observations around the expected knot-crossing time in addition to Fermi-LAT monitoring to search for any subsequent flares. All proposed targets are candidates for a mix of stationary and superluminal features in the inner jet. The proposed observations strategically target the radio/gamma-ray connection and test the recollimation shock model for blazar jets.</p>
121077	DIMITRIOS	GIANNIOS	A SIMPLE MODEL TO UNDERSTAND THE BLAZAR SEQUENCE	<p>Blazars are AGNs with a relativistic jet propagating towards us. Fermi-LAT allowed, for the first time, for the systematic study of the blazar populations in the gamma-ray band discovering that weaker blazars are characterized by, on average, harder spectra than powerful ones. We propose a simple idea to explain this trend: all jets are launched with similar magnetic energy per baryon, independently of their power. Powerful jets reach high bulk Lorentz factors (as observed in the radio) and, as a result, they have rather modest magnetization in the emission region. Magnetic reconnection models predict that this results in steep emission spectra in the Fermi band. For weaker objects the opposite holds true. We will perform radiative transfer simulations to critically test this model.</p>

121078	CHANGAM MEENA	RAJAGOPAL	HUNTING HIGH-REDSHIFT BL LACERTAE OBJECTS	We will perform 10-filter photometry, using Swift and SARA-CT, with the goal of measuring photometric redshifts for the Fermi BL Lacs (unknown z) visible from Chile. SARA+UVOT coupling allows us to determine accurate photo-z in the 1.3--8.0 range. We will target 67 objects and expect to find ~6 of them at $z > 1.3$ thus increasing the current sample size of 26 such sources by 23%. While undoubtedly rare, these detections represent a major achievement as high-z BL Lacs probe the UV-optical radiation field and allow us to understand the evolution of the blazar family. This program will provide high-quality nIR-to-UV data that will be released to the general public.
121082	FLOYD	STECKER	DETERMINING THE RELATIONSHIP BETWEEN THE FERMI AND ICECUBE NEUTRINO OBSERVATIONS: A MULTIMESSENGER APPROACH	We propose to calculate neutrino spectra by modeling possible "hidden" low gamma-ray luminosity sources, considering proton acceleration by shocks, magnetic recombination, and tidal disruption. We will take account of the implications of Fermi observations of objects such as the radio galaxies listed in the 4FGL Catalog, comparing our model predictions with the fluxes of observed sources for consistency. We will also take account of the implications of the observations of the extragalactic gamma-ray background over all energy ranges observed by Fermi, keeping in mind that an analysis of the IceCube data optimized for point sources found no overall correlation between Fermi-observed blazars and the diffuse neutrino background. Using the new 4FGL Catalog will put constraints on the models.
121090	AMANPREET	KAUR	RADIO FOLLOW UP OF THE LIKELY X-RAY PULSAR POSITIONS OF THE FERMI UNASSOCIATED SOURCES	Unassociated sources represent a major fraction (~ 1/3rd) of the overall Fermi source population. A challenge to identifying such sources are large positional uncertainties associated with them (~ arcmins). Our observations with the Swift-XRT localize counterpart positions to a few arcseconds, providing an opportunity to follow up at other wavelengths. To identify pulsars in this sample, we compared various Fermi gamma-ray properties and X-ray fluxes of known pulsars with these unassociated sources. By implementing machine learning methods, we have identified the highly likely pulsar candidates from this sample. We seek confirmation of 12 of these through a search for radio pulsations using 30 hours at the Green Bank Telescope (2 GHz) utilizing the precise X-ray positions.

121094	SVETLANA	JORSTAD	VARIABILITY OF EMISSION LINES IN GAMMA-RAY QUASARS AND RADIO GALAXIES	We propose to observe a sample of gamma-ray quasars and radio galaxies with the 4.3 m Discovery Channel Telescope to investigate variations of emission lines during gamma-ray/optical outbursts. We will 1) establish a quiescent spectrum for each source in the sample, 2) create a FeII-FeIII template for a quiescent quasar-blazar, 3) monitor the spectral line behavior of a flaring source, measuring line variability during 2-3 such events, 4) use the CLOUDY code to model gas parameters during quiescent and active states; and 5) search for explanations of line variability.
121095	ANDREY	TIMOKHIN	JETS OF LOW-LUMINOSITY AGNS POWERED BY ELECTROMAGNETICALLY DRIVEN PAIR CASCADES	We propose to develop detailed self-consistent microscopic models for electromagnetically driven electron-positron pair cascades which are believed to be responsible for creating jets in underluminous AGNs and test these models against observed gamma-ray emission in GeV and TeV domain. We will use modified versions of tools developed initially to study pair cascades in pulsars: a hybrid Particle-In-Cell/Monte Carlo code, which models electromagnetically driven pair cascades in a truly self-consistent way, and a semi-analytic model of pair cascades which can explore a large range of physical parameters very efficiently.
121102	ANNIKA	PETER	THE MYSTERIOUS SOLAR GAMMA-RAY EMISSION: POWERFUL NEW TESTS AT LOW ENERGIES	The Sun's bright, time-varying emission of gamma rays indicates that it is a laboratory for Galactic cosmic rays (GCR) and their interaction with the solar environment. Yet, observations above 1 GeV are at odds with theories of GCR interactions with the Sun, indicating that models of GCR propagation are incomplete. To reveal solar magnetic structure in the energy range at which it has the biggest effect on GCR propagation, we propose a new time-series analysis of a full solar cycle of Fermi-LAT data at 0.1-1 GeV, and a theoretical framework to interpret the observations. Our time- and morphology-based analysis, only possible because of Fermi's long lifetime, is a critical input to improved theoretical models of the Sun's magnetic environment from the photosphere to the Earth.

121106	TRACY	SLATYER	CHARACTERIZING UNRESOLVED POINT-SOURCE POPULATIONS IN THE INNER GALAXY	<p>We propose a new study of populations of unresolved gamma-ray point sources, which are too faint to be individually catalogued but can be significant in aggregate, in the inner Galaxy. Such faint sources may comprise the bulk of the Galactic Center Excess of GeV-scale gamma rays; alternatively, their presence could confuse attempts to discern the origins of the excess, in particular whether it could be a signal of annihilating dark matter. We will use non-Poissonian template fitting techniques to map out the spatial morphology and properties of such source populations, and test for populations correlated with known physical structures. This work will advance our understanding of the inner Galaxy and the origins of the Galactic Center Excess, complementing catalogues of resolved sources.</p>
121109	ABE	FALCONE	SYSTEMATIC SEARCH FOR X-RAY COUNTERPARTS OF FERMI-LAT UNASSOCIATED SOURCES USING SWIFT: NEW BLAZARS, PULSARS, AND MORE	<p>We propose to use Swift to search for X-ray and UV/optical counterparts of unassociated FL8Y/4FGL Fermi-LAT sources. Prior programs led to Swift observations of 261, 199, & >550 Fermi unassociated sources from the 1,2, & 3FGL catalogs respectively. Possible x-ray counterparts are found in ~1/3 of these. We propose >200 new observations of 4FGL unassociated sources. These new data will determine the properties (with ~5 arcsec positions) of all detected X-ray sources in the LAT regions, contributing to identification, classification, and follow-up. This proposal supports the large analysis and interpretation task, which will require additional data reduction software. The Swift PI and Exec Committee commit to the Swift observing time. Reduced data will be made publicly available to everyone.</p>
121112	NICOLA	OMODEI	ON-LINE REAL-TIME FERMI-LAT GRB CATALOG: A LEGACY FOR FERMI	<p>The second Fermi LAT GRB catalog, currently under review, includes 186 GRBs detected by the LAT in 10 years. Most of these GRBs are previously unpublished, and several follow-up studies could be performed. Although GRBs will continue to be detected by the LAT, a third catalog will not be published any time soon. Having real time analysis delivered to the public is essential, especially with Gravitational Wave observatories detecting neutron star mergers, and IACT detecting very high-energy photons from LAT GRBs. With this proposal we plan to extend the LAT GRB catalog pipeline, to analyze real-time events and to deliver our results to the community, including spectral files and response functions that can be used to re-analyze Fermi LAT data with standard tools such as XSPEC and gspec.</p>

121114	MATTHEW	BARING	MAGNETIC PAIR TRANSPARENCY PROBES OF EMISSION ALTITUDES IN FERMI-LAT PULSARS	Fermi's pulsar legacy has included the identification of quasi-exponential maximum energy turnovers in the 1-8 GeV band in most pulsars. An exception is provided by the Crab pulsar, whose pulsed spectrum smoothly turns over to a steeper quasi-power law that extends above 1 TeV. By invoking transparency of dipole magnetospheres to magnetic pair creation, we have been able to estimate that the Crab's emission comes from around 20% of the light cylinder radius. This proposal upgrades this analysis to treat more realistic field morphologies, specifically including rotational sweepback and light aberration. These enhancements will refine the altitude determination for not only the Crab, but other pulsars, especially Vela, which has now been detected by H.E.S.S. out to around 100 GeV.
121119	MATTIA	DI MAURO	DETECTING GAMMA-RAY HALOS AROUND PWNE AND INTERPRETATION OF THE POSITRON EXCESS	The HAWC Collaboration has discovered gamma-ray halos around the Geminga and Monogem pulsar wind nebulae (PWNe) at TeV energies. We propose to analyze Ferm-LAT data from GeV up to TeV energies in the direction of the most energetic and closest PWNe and search for an extended emission which can be attributed to positrons and electrons accelerated by these sources and inverse Compton scattering with the interstellar radiation field. We anticipate Fermi-LAT has the sensitivity to detect tens of these gamma-ray halos. We will use the results of this analysis to study the emission mechanism of PWNe and to estimate their contribution to the positron excess. We plan to release the tools used for this project.
121122	TIMOTHY	LINDEN	CORRELATING FERMI-LAT AND ASAS-SN DATA TO UNDERSTAND BLAZARS	Despite the fact that blazars are among the brightest gamma-ray sources, they are not well understood. One line of investigation concerns the significant variability observed from blazars on all temporal and energy scales. While gamma-ray analyses can be limited by low-photon counts, correlated temporal studies between gamma-ray and optical surveys provide a powerful probe of the underlying blazar emission mechanism. We propose the first correlation of all Fermi blazars with optical observations provided by the All-Sky Automated Search for SuperNovae (ASAS-SN), which has the high cadence and large field-of-view optimal for this study. Using this cross-correlation we will be able to perform population-level analyses of the underlying blazar variability and emission mechanism.

121131	DEREK	FOX	MULTIMESSENGER NEUTRINO + FERMI ALERTS AND TRIGGERED OPTICAL FOLLOW-UP OBSERVATIONS	<p>We request Fermi support to calculate and distribute the first coincident multimessenger neutrino + gamma-ray alerts via analysis of Fermi LAT gamma-ray and ANTARES and IceCube neutrino data, and to pursue NAOO optical follow-up observations of these alerts. Although IceCube demonstrated the existence of high-energy cosmic neutrinos in 2013, only one high-confidence counterpart has been identified to date. If some or most neutrino sources are transient they may have bright electromagnetic counterparts, and coincidence studies would provide a promising approach to discovering them, with triggered follow-up observations serving to confirm their nature. We propose to pursue both elements of this strategy, and potentially, discover the first transient sources of high-energy cosmic neutrinos.</p>
121132	PETER	VERES	STATE OF THE ART ATMOSPHERIC SCATTERING MODEL FOR FERMI-GBM:POSSIBLE POLARIZATION MEASUREMENT AND IMPROVED LOCALIZATIONS	<p>We propose to revisit the atmospheric scattering responses for about half a dozen Fermi GBM detected gamma-ray bursts (GRBs). We will carry out modern, state of the art atmospheric response simulations for this selection of GRBs. An interesting application of the improved atmospheric responses will be to probe if GBM can detect polarization signatures from GRBs using Earth's atmosphere as a scattering surface. Additionally, we will use the atmospheric responses to reduce the systematic error on the GRBs localized by GBM.</p>
121133	SVETLANA	JORSTAD	OPTICAL POLARIMETRIC & PHOTOMETRIC MONITORING OF GAMMA-RAY BLAZARS	<p>We propose to monitor the flux (BVRI bands) and optical linear polarization of 44 gamma-ray AGN 7-10 nights per month at the 1.8m Perkins telescope with emphasis on polarization and flux monitoring during gamma-ray events. We will construct gamma-ray and optical light curves and polarization curves to determine correlations between gamma-ray and optical flux variations, gamma-ray and optical spectral indices and their behavior, patterns of gamma-ray and optical polarization parameters at different states of gamma-ray activity, and magnetic field properties in optical emission regions compared with those in the mm-wave jet. This information will lead to important insights into the particle acceleration mechanisms and locations of gamma-ray emission sites in AGN.</p>

121134	MICHAEL	CHERRY	TERRESTRIAL GAMMA FLASHES: PRODUCTION MECHANISMS AND SOURCE GEOMETRY	<p>The observations of Terrestrial Gamma-ray Flashes (TGFs) conducted by the Gamma-ray Burst Monitor (GBM) have revealed important information about TGF production mechanisms. These observations can be used along with optical lightning emission detected by the Geostationary Lightning Mapper (GLM), radio frequency emission recorded by the ground-based lightning detection networks, and optical and gamma ray measurements by ASIM to further investigate the TGF source geometry and characteristics. These include the TGF production altitudes and source geometry. The area of the optical flash provided by GLM gives insightful information about the TGF production altitude. Additionally, the GLM high-efficiency optical observations can be used to conduct a detailed study of the TGF beaming.</p>
121136	ERIC	SCHLEGEL	CATACLYSMIC VARIABLES: GAMMA-RAY EMITTERS OR NOT?	<p>We propose to analyze LAT data to search for emission from cataclysmic variables (CVs). CVs are predicted to be low-luminosity emitters via a variety of mechanisms. The previous detection/upper limit search conducted in 1995 used EGRET data. That result was nullified by small-scale structure uncovered in the EGRET background in 2008. Consequently, a new search must be undertaken to provide reliable detections or upper limits on the gamma-ray emission of CVs so that progress may be made to understand the emission mechanisms. The LAT provides a significant 2 orders of magnitude improved sensitivity over EGRET, suggesting a new search would be of interest even without the EGRET background limitations. Our analyses will include phase-folded, burst, and stacked approaches.</p>
121138	VAHE'	PETROSIAN	TESTING PRODUCTION OF LONG-DURATION SOLAR FLARE GAMMA-RAYS BY PARTICLES ACCELERATED AT THE CME-SHOCK	<p>Fermi-LAT has detected long-duration >100 MeV gamma-rays, contemporaneous with SEPs, in many flares with associated fast CMEs, including three originating from active regions (ARs) behind the limb (BTL). This and other evidences point to the possibility of production of gamma-rays by particles accelerated at the CME-shocks, with the BTL flares indicating connection of the CME-shock to areas on the Sun far away from the ARs. Our preliminary MHD simulation support this view and provide data (e.g. field convergence, Alfven and shock speed, compression ratio) useful for study of the acceleration-transport processes. We propose similar investigation of two other promising X-class flares with broad coverage of radiative and particle signatures.</p>