Generation-GW: Diving into gravitational waves

Program and abstracts

University of the Virgin Islands

St. Thomas, US Virgin Islands

June 5-9, 2017

Tuesday June 6	Session 1: "GW Counterpart Search from Space"	Wednesday June 7	Session 3: "GW Detectors in space"	Thursday June 8	Session 5: "EM Counterparts 1"	Friday June 9	Session 6: "GW Sources 2"
	chair: Mike Cherry		chair: Jan Staff		chair: Brad Cenko		chair: Marta Volonteri
9:00-9:30	Welcome	9:00-9:45	**Catia Grimani**			9:00-9:30	Jillian Bellovary
9:30-10:15	**Jamie Kennea**	9:45-10:15	Jacob Slutsky	9:30-10:15	**Miriam Cabero Muller**	9:30-10:00	David Kaplan
10:15-10:45	Phil Evans	10:15-10:45	Ann Hornschmeier	10:15-10:45	Philip Cowperthwaite	10:00-10:30	Johan Samsing
10:45-11:00	Coffee break	10:45-11:15	Coffee break	10:45-11:15	Coffee break	10:30-11:00	Coffee break
11:00-11:30	Barbara Patricelli	11:15-12:00	**Alberto Sesana**	11:15-11:45	Iair Arcavi		Session 7:
11:30-12:00	Eric Burns	12:00-12:30	Sean McWilliams	11:45-12:15	Griffin Hosseinzadeh		"EM Counterparts 2"
12:00-12:30	Judith Racusin	12:30-2:30	Lunch	12:15-2:15	Lunch		chair: Nino Cucchiara
12:30-2:30	Lunch		Session 4: "GW Sources 1"		chair: David Morris	11:00-11:45	**Brad Cenko**
	chair: Jake Slutsky		chair: Judith Rakusin	2:15-2:45	Jeff Cooke	11:45-12:15	Laura Gosset
2:30-3:00	Takanori Sakamoto	2:30-3:00	Shengua Yu	2:45-3:15	Andrea Melandri	12:15-2:00	Lunch
3:00-3:30	Nicholas Cannady	3:00-3:30	Marta Volonteri	3:15-3:45	Coffee break	2:00-2:30	Paul O'Brian
3:30-4:00	Coffee break	3:30-4:00	Coffee break	3:45-4:15	Jan Staff	2:30-3:00	Marko Krco
	Session 2: "LIGO"	4:00-4:30	Laura Blecha	4:15-5:15	Panel Discussion	3:00-3:30	Marin Anderson
4:00-4:45	**Anamaria Effler**	4:30-5:00	Tomasz Bulik			3:30-4:30	Panel Discussion
4:45-5:30	Sylvia Zhu/Avneet Singh						
		7:00-10:00	Conference Dinner at Iggy's				

Invited speakers are listed in **bold**.

Tuesday 9:30am-10:15am:

Invited talk: Teaching the old dog new tricks: Finding GW EM counterparts with Swift

Jamie Kennea

Abstract: Now we are in the era of GW detections, the next great leap will be the connection of GW detections and traditional astronomy, that is, the detection of an electromagnetic counterpart of a GW event. Many of the GW events are expected to be NS-NS mergers, which create short GRBs. Given it's prime mission to find GRBs, Swift would appear to be an ideal observatory to co-detect one of these events. However, the expect rate of co-detection is predicted to be low. Therefore, we are taking a proactive approach, instead of hoping for a co-detection, when a GW event occurs, Swift will perform large scale tiling effort in order to cover the maximal probability areas of the GW error region. We reduce the problem by convolving the GW error region with known Galaxy catalogs, but still this will involve Swift observing up to 1000 targets over a 48 hour period. This required the re-invention of the way Swift operates. In this talk we will detail this and the Swift discoveries in LIGO O1 and O2.

Tuesday 10:15am-10:45am:

Finding X-rays from a GW event

Phil Evans

Abstract: At the time of writing, no confirmed EM counterpart of a Gravitational Wave (GW) event has been detected. Many of the phenomena expected to produce GW signals decetable by advanced LIGO/VIRGO are also expected to produce transient X-ray emission. Examples include Gamma Ray Bursts, core-collapse supernovae and flares from Soft Gamma Repeaters. The Swift X-ray telescope has a programme to proactively search for X-ray emission in the LIGO/VIRGO error regions - as will be described by J. Kennea. In this talk I will describe the X-ray signals expected from GW-emitting objects, both those already observed (e.g. on-axis GRBs, SGR flares) and those theoretically predicted (e.g. off-axis neutron star mergers). I will then discuss the challenges involved in detected these signals, and particularly in identifying the GW counterpart from among the other X-ray signals detected when searching a large error region.

Tuesday 11:00am-11:30am:

Prospects for joint GW, high-energy and very high-energy EM observations of binary neutron star mergers

Barbara Patricelli

Abstract: With the recent detection of two binary black hole (BBH) mergers by Advanced LIGO the era of gravitational wave (GW) astronomy has begun. Besides BBH mergers, one of the most promising sources for the next GW detections is the coalescence of binary neutron stars (BNS) and black holes (NSBH). These mergers are thought to be connected with short GRBs and combined observations of GW and electromagnetic (EM) signals could definitively probe this association. Large field-of-view (FOV) instruments such as Fermi will be crucial to observe the high-energy EM counterparts of GW signals. Furthermore, future instruments such as the Cherenkov Telescope Array (CTA) will be fundamental for the EM follow-up at very high energies, owing to its unprecedented sensitivity and rapid response capability (few tens of seconds). We will present a comprehensive study on the prospects for joint GW, high energy and very-high-energy EM observations of merging BNSs with Advanced LIGO and Virgo, Fermi and CTA.

Tuesday 11:30am-12:00pm:

Sub-threshold Searches with Fermi GBM for Gamma-ray Counterparts to Gravitational Wave Triggers

Eric Burns

Abstract: The Fermi GBM has a unique partnership with Advanced LIGO since it is the most prolific detector of short gamma-ray bursts. To maximize this partnership two searches for untriggered events in GBM data were developed, a blind search for short gamma-ray bursts and a search targeted around GW triggers. We discuss these searches and the results from the O1 run.

Tuesday 12:00pm-12:30pm:

Fermi-LAT Observations of Gravitational Wave Sources

Judith Racusin

Abstract: The wide energy range and all-sky survey operations of the Fermi Large Area Telescope (LAT) make it an important asset in the search for electromagnetic counterparts to gravitational wave sources. LAT regularly detects long-lasting high-energy gamma-ray emission from short gamma-ray bursts, which are commonly associated with compact binary mergers that include neutron stars. As demonstrated by the recent upper bounds set on LAT emission from GW150914, LVT151012, and GW151226, LAT provides sensitive observations of the large gravitational wave localization regions in normal survey operations. Over the coming years, as LIGO and Virgo approach design sensitivity and will soon be able to detect these mergers, LAT will continue to provide a unique capability to potentially localize and characterize gravitational wave events.

Tuesday 2:30pm-3:00pm:

Search for the hard X-ray counterpart of gravitational wave events by CALET Gamma-ray Burst Monitor

Takanori Sakamoto

Abstract: We will present an on-going search for the hard X-ray counterpart of gravitational wave events in the CALET Gamma-ray Burst Monitor (CGBM). The CGBM is the secondary scientific instrument of the CALET mission on the International Space Station (ISS) which covers the energy range from 7 keV up to 20 MeV combining two different types of detectors: the Hard X-ray Monitor (HXM) and the Soft Gamma-ray Monitor (SGM). Although the CGBM is not capable for localizing the transient events, it contains a wide field of view to monitor the hard X-ray sky. Since the start of the scientific operation on October 2015, the CGBM has been detecting more than 50 gamma-ray bursts (GRBs) including 9 short-duration GRBs. Using the continuous collecting data, we are actively reporting the results of the hard X-ray counterpart search for gravitational wave events. We will report the preliminary results of the hard X-ray counterpart search for gravitational wave events by the CGBM.

Tuesday 3:00pm-3:30pm:

CALET Observations of High Energy Gamma-Ray Counterparts to GRBs and Gravitational Wave Events

Nicholas Cannady

Abstract: We present a summary of the search for high-energy counterparts to GRBs and gravitational wave events in the CALorimetric Electron Telescope (CALET) primary calorimeter (CAL). The CAL is sensitive to gamma-rays in the energy range 1 GeV 10 TeV, with a field of view covering approximately 2 sr. We describe the methodology for gamma-ray identification in the CAL, calculation of the exposure on the sky for given trigger modes and geometric conditions, and present preliminary results on observation of known sources and upper limits on fluxes for transient counterparts.

Tuesday 4:00pm-4:45pm:

Invited talk: The LIGO detectors

Anamaria Effler

Abstract: The Advanced LIGO (Laser Interferometer Gravitational-wave Observatory) detectors finished installation in 2014; after about a year of commissioning they started their first science run and observed two gravitational wave signals from black-hole binary coalescences - the first ever direct observation. LIGO is currently in its second science run, albeit not yet running at design sensitivity. This talk is focused on the detectors themselves, how they work, what are some of the challenges in terms of uptime and sensitivity, as well as future plans. "The LIGO instruments can detect a differential arm length change on the order of one 10,000th of the size of a proton" is a statement that should not seem outlandish after attending this talk.

Tuesday 4:45pm-5:30pm:

Continuous gravitational wave signals

Sylvia Zhu/Avneet Singh

Abstract: In this talk I will review the status of the field, in its efforts to make the first detection of this type of signals.

Wednesday 9:00am-9:45am:

Invited talk: Environmental studies for and with the future interferometers for gravitational wave detection in space

Catia Grimani

Abstract: Lisa Pathfinder is the mission of the European Space Agency dedicated to the testing of the technology that will be placed aboard the first interferometer for gravitational wave detection in space, LISA. Cosmic rays of galactic and solar origin charge the free-falling test masses constituting the mirrors of the interferometer in LISA Pathfinder, LISA and LISA-like missions. This charging process represents one of the main sources of noise for space interferometers at low frequencies. Monte Carlo simulations of the radiation environment in the interplanetary medium are mandatory to study the performance variation of present and future interferometer generations. The outcomes of this mission dedicated environmental studies, developed for gravitational wave space interferometers, can be extended to other space missions. Particle detectors aboard LISA and LISA-like experiments allow for the study of the oscillations of galactic cosmic rays and SEP flux evolution.

Wednesday 9:45am-10:15am:

The LISA Pathfinder Mission

Jacob Slutsky

Abstract: This talk presents the performance and status of the LISA Pathfinder mission. LISA Pathfinder is a technology demonstrator for a space-based observatory for gravitational waves in the milli-Hertz band. ESA recently solicited proposals for its third Large-class mission (L3), to be fulfilled by a space-borne gravitational wave observatory. Any such mission will take advantage of the significant technology development already made, especially with LISA Pathfinder, which is led by ESA, with significant NASA contributions. This mission has successfully placed two test masses in drag-free flight and currently measures the relative acceleration between them to a sensitivity that validates a number of critical technologies for LISA-like gravitational wave instruments, including drag-free control of the test masses, low noise microNewton thrusters, and picometer-level laser metrology in space. Launched in late 2015, LISA Pathfinder is currently in its extended mission.

Wednesday 10:15am-10:45am:

Gravitational Waves from Space, a NASA Perspective

Ann Hornschmeier

Abstract: Gravitational wave observations from a space observatory remain a high priority within the NASA Astrophysics portfolio, under its Physics of the Cosmos (PCOS) program. Such a space observatory is expected to be a laser interferometer, commonly referred to as the Laser Interferometric Space Antenna (LISA). A LISA-like observatory will study the evolution of supermassive black hole mergers from very early times in the Universe, ultracompact binaries in the Milky Way, and the nature of Extreme Mass Ratio Inspiral (EMRI) events as well as other exciting topics. In addition to highlighting these science elements, this talk will cover recent activities under the NASA PCOS program, including the work of the L3 Study Team (L3ST), potential contributions to LISA/L3 in Europe and NASA's contribution to LISA Pathfinder activities.

Wednesday 11:15am-12:00pm:

Invited talk: The future of gravitational wave detection: the low frequency band

Alberto Sesana

Abstract: Since the LIGO detection last year, gravitational waves (GWs) are in the spotlight. Yet LIGO can only probe the audio-band, leaving much of the GW universe unveiled. Future space based interferometers like the Laser Interferometer Space Antenna (LISA) and current and upcoming pulsar timing campaigns can peer into the low frequency GW Universe, probing a wide range of physics from the cosmic history of supermassive black holes to the primordial Universe. I will describe the LISA and pulsar timing effort emphasising their scientific payouts.

Wednesday 12:00pm-12:30pm:

Space-based gravitational-wave detector design and its impact on black-hole binary science

Sean McWilliams

Abstract: Motivated by ongoing efforts in the United States and Europe to move forward with the Laser Interferometer Space Antenna (LISA), the study of space-based mission concepts has resulted in an improved understanding of the impact that various design choices will have on the science capabilities of an eventual mission. This improved understanding will influence the choices adopted for LISA itself, and will also inform future possibilities for smaller scale missions as well as the next generation of L-class gravitational-wave mission beyond LISA. We will focus on a small number of critical design choices, and present theoretical results regarding the impact of those choices on detection and parameter estimation of black-hole binaries across the mass spectrum. We will also discuss how the physics included when modeling gravitational waveforms can have a dramatic impact on these conclusions.

Wednesday 2:30pm-3:00pm:

The gravitational wave background of Galactic neutron star neutron star and neutron star white dwarf binaries

Shenghua Yu

Abstract: The gravitational wave (GW) signals predicted by the General Relativity have been detected by the Laser Interferometer Gravitational-Wave Observatory. The high-frequency GW bursts are believed to be generated by mergers of stellar mass black hole binaries. However, a long-standing GW background generated by a large number of double compact objects at lower frequencies would also have imposed oscillations on the flat space-time. We here pay attention to the GW background of Galactic neutron star neutron star and neutron star white dwarf binaries, and will discuss the observability of the background.

Wednesday 3:00pm-3:30pm:

Formation of massive black hole binaries

Marta Volonteri

Abstract: I will discuss our work on the formation of massive black hole binaries and review theoretical predictions for merger rate of massive black holes detectable with LISA and PTA. I will also connect the merger of massive black holes to their possible seeds, via PopIII stars, and how they can be instead detected by LIGO.

Wednesday 4:00pm-4:30pm:

Modeling the Population of Merging and Recoiling Supermassive Black Holes

Laura Blecha

Abstract: When two black holes (BHs) merge, asymmetry in their gravitational wave (GW) emission imparts a recoil kick to the remnant BH, which can be up to thousands of km/s. The coming years hold great promise for GW detections of BH binaries across the mass scale. However, prior to the advent of a space-based GW detector, the best evidence for supermassive BH (SMBH) mergers may come from electromagnetic signatures of recoiling SMBHs. I will review recent progress in identifying recoil candidates, and Ill describe results from modeling the observable population of GW recoils, based on the Illustris cosmological simulations. In particular, our models suggest promising avenues for finding a population of recoiling SMBHs in wide-field surveys such as LSST and WFIRST. Such systems could be used to constrain SMBH evolution and GW event rates. Finally, I will describe our ongoing work to model GW sources and their host galaxies using state-of-the-art cosmological hydrodynamics simulations.

Wednesday 4:30pm-5:00pm:

On the origin of merging binary black holes

Tomasz Bulik

Abstract: The detection of merging binary black holes by LIGO leads to the question of where do they originate from. Several scenarios have been proposed: evolution of binaries in the filed, stellar evolution in globular clusters, and population III binaries. I will review the models and their consequence. I will discuss possible ways to distinguish between them with the use of various observations.

Thursday 9:30am-10:15am:

Invited talk: Compact binary coalescences with Advanced LIGO

Miriam Cabero Muller

Abstract: The first observing run of Advanced LIGO has proven the existence of binary black hole coalescences, and has provided the ability of performing new tests of General Relativity. While the second observing run is still ongoing, it is unknown what the future holds for the field of gravitational-wave astronomy. We will give an overview on the current state of searches for merger signals, and how this will aid on the detection of other type of binary mergers.

Thursday 10:15am-10:45am:

Deep and Rapid Optical Follow-Up of Gravitational Wave Triggers with DECam

Philip Cowperthwaite

Abstract: We report on the results of our program to search for optical counterparts of gravitational wave sources detected during the first Advanced LIGO observing run (O1). This program is a joint effort between a broad community and the Dark Energy Survey (DES). Our program uses the Dark Energy Camera (DECam) mounted on the 4-m Blanco Telescope at CTIO in Chile. The DECam imager has a 3 sq-deg field of view and can achieve a five sigma limiting magnitude of i,z 23 mag in 90 second exposures. This makes DECam one of the most powerful instruments for efficient and rapid searches of gravitational wave localization regions in the Southern sky. In this talk, we discuss the development of observing strategies and present results from our follow-up campaign for the first Advanced LIGO gravitational wave events, GW150914 and GW151226.

Thursday 11:15am-11:45am:

Targeted EM Followup of GWs with Las Cumbres Observatory

Iair Arcavi

Abstract: Most EM strategies to follow GW triggers require tiling the localization region. A different approach involves targeting specific galaxies in the localization region. For this, wide-field cameras are not required, but flexible rapidly-responding telescopes have the advantage. We employ this strategy with Las Cumbres Observatory (LCO), a worldwide robotic network of telescopes, and currently the only operator of robotic 2m-class telescopes capable of rapid response in both northern and southern hemispheres. Within the expected range of 100 Mpc for a NS merger, 50the mass inside a typical GW localization is contained in only a few dozen galaxies - a number than can be covered by LCO down to mag 22 in multiple bands in a single night. As GW detection ranges increase but localizations shrink, the number of galaxies in the search region will remain roughly the same. This followup approach can therefore continue to be employed, provided high-completeness galaxy catalogs are available.

Thursday 11:45am-12:15pm:

Las Cumbres Observatory: A Global Network of Robotic Telescopes for Time-Domain Follow-Up

Griffin Hosseinzadeh

Abstract: In the era of large time-domain surveys and multiwavelength/multimessenger astronomy, rapid follow-up of astronomical transients is crucial to maximizing the science return on each discovery. Las Cumbres Observatory (LCO), a global network of robotic telescopes, is uniquely optimized to provide this follow-up. Our nine 1-meter and two 2-meter telescopes can provide multiband photometry and low-resolution spectroscopy of transients within hours of discovery. Over the last three years of science operations, LCO has demonstrated spectacular success in producing light curves and spectral series of supernovae, AGN, microlensing events, and exoplanet transits. In addition, we have used our FLOYDS spectrographs to classify the brightest EM counterpart candidates discovered by wide-field telescopes during the first two aLIGO observing runs. For future GW events, especially those involving neutron stars, FLOYDS will be an excellent tool for sorting through the flood of candidates.

Thursday 2:15pm-2:45pm:

The Deeper, Wider, Faster program: a novel multi-wavelength, real-time solution to detect counterparts to gravitational waves

Jeff Cooke

Abstract: I will present the ongoing Deeper, Wider, Faster (DWF) program to detect fast (seconds-to-hours) transients, such as SN shock breakouts, kilonovae, GRBs, and fast radio bursts, many of which are predicted to be associated with gravitational wave (GW) events. DWF coordinates simultaneous wide-field, fast-cadenced observations using Parkes, Molonglo, CTIO DECam (m   25) and Swift moving in-step to provide a deep, multi-wavelength search. DWF performs real-time (seconds) data processing and real-time (minutes) software and visual identification to enable rapid Gemini 8m 'flash' spectroscopy (within minutes), as well as deep longslit (SALT) and wide-field ToO spectroscopy (AAT). Finally, DWF coordinates a network of 1-10m telescopes (e.g., Keck, ATCA, MWA, REM, SkyMapper, Zadko, ANU 2.3m and AST3-2) for additional simultaneous, rapid, and longer-term follow up. I will discuss the results of the successful DWF program runs and the capabilities for future GW counterpart searches.

Thursday 2:45pm-3:15pm:

GRAWITA results of optical follow-up observations of GW triggers

Andrea Melandri

Abstract: The detection of an electromagnetic (EM) emission associated with a gravitazional wave (GW) signal is one of the main goal of the newly born GW astronomy. Merger of neutron stars (NS) and/or black holes (BH) and core-collapse of massive stars are expected to cause rapid transient EM signals like gamma-ray bursts (GRBs), core-collapse supernovae, soft-gamma ray repeaters and pulsar glitches. Since 2015 September 14th (GW150914) the Advanced LIGO detectors detected few binary BH merger and burst events. The former are not expected to generate an EM counterpart while the latter type of events (i.e. involving at least one NS) could in principle give birth to a detectable EM signal. The Advanced LIGO detections demonstrated that EM follow-up facilities are able to react quickly to GW signals, covering radio, optical, near-infrared, X-ray, and gamma-ray wavelengths with ground- and space-based observations over the entire GW sky map, even when they have to deal with large position uncertainties up to hundreds square degrees. Therefore wide-field cameras and rapid follow-up observations are crucial to characterize the EM candidates and hopefully discover the first EM counterpart of a GW signal. In this talk I want to review the state of the art of this new astronomical field and present the activities we are currently currying (and the results we obtained) within the GRAWITA network. The GRAWITA project it is proving as an efficient operational framework capable of fast reaction on large error box triggers and direct identification and characterization of the transient candidates.

Thursday 3:45pm-4:15pm:

Spindown of Isolated Neutron Stars: Gravitational Waves or Magnetic Braking?

Jan Staff

Abstract: We study the spindown of isolated neutron stars from initially rapid rotation rates, driven by two factors: (1) gravitational wave emission due to r-modes and (2) magnetic braking. In the context of isolated neutron stars, we present a study including self-consistently the magnetic damping of r-modes in the spin evolution. We track the spin evolution employing the RNS code, which accounts for the rotating structure of neutron stars for various equations of state. We find that, despite the strong damping due to the magnetic field, r-modes alter the braking rate from pure magnetic braking for $B \leq 10^{13}$ G. The r-mode can also decrease the time to reach the threshold central density for quark deconfinement. Within a phenomenological model, we assess the gravitational waveform that would result from r-mode-driven spindown of a magnetized neutron star.

Friday 9:00am-9:30am:

LIGO Sources in AGN Disks

Jillian Bellovary

Abstract: Circumnuclear disks around supermassive black holes (SMBHs) provide an environment friendly to the growth and merging of black holes detectable by LIGO. In prior work, I have shown that active galactic nucleus (AGN) disks may contain migration traps: radii where torques balance, causing the buildup of material. In this talk I will present my preliminary results of N-body simulations of stellar mass black holes migrating in AGN disks, which build up at migration traps in the disk and merge, resulting in events detectable by LIGO.

Friday 9:30am-10:00am:

The search for radio emission from gravitational wave events

David Kaplan

Abstract: The race is on to find electromagnetic counterparts of gravitational wave events, which will play a crucial role in identifying the astronomical host of the events and measuring key physical parameters. We present the results of the radio follow-up of GW150914 with the Murchison Widefield Array and the Australian Square Kilometre Array Pathfinder as part of the first aLIGO observing run. The capabilities of these instruments means we can cover the whole LIGO probability sky map starting within seconds to minutes of receiving a trigger. We will discuss the expected types of signals we might see, the follow-up survey strategy and the prospects for future detections.

Friday 10:00am-10:30am:

Formation of High Eccentricity GW Mergers

Johan Samsing

Abstract: Recent studies show that the binary black hole (BBH) spin vectors are likely to differ between different merger channels, however, only little work has been done on deriving corresponding differences in BBH eccentricity. In my talk, I will show using analytical arguments and general relativistic N-body simulations, that $> 1\%$ of all BBH mergers forming in globular clusters via binary-single interactions will have eccentricities e 0.1 when coming into the LIGO band. Together with spin, eccentricity is probably the other most promising parameter to help observationally distinguish between different astrophysical BBH merger channels. In addition, my calculations even suggest that binary-single interactions are likely to dominate the population of high eccentricity BBH mergers detectable by LIGO.

Friday 11:00am-11:45am:

Invited talk: Observational constraints on kilonova emission following short GRBs

Brad Cenko

Abstract: Optical/NIR emission from the radioactive decay of neutron-rich ejecta following the merger of two neutron stars (i.e., kilonovae) are thought to be promising electromagnetic counterparts to gravitational wave detections from advanced LIGO and Virgo. I will review observational constraints on the late-time (t ¿ 1 day) optical and NIR emission from known short-duration gamma-ray bursts (also thought to be powered by binary neutron star mergers) and discuss the implications for future searches.

Friday 11:45am-12:15pm:

Hunting for gravitational wave sources with SVOM space mission

Laura Gosset

Abstract: SVOM is a French-Chinese space mission to be launched in 2021, and whose goal is the study of Gamma-Ray Bursts (GRBs) and other kinds of transients from infrared to gamma rays. The Micro-channel X-ray Telescope (MXT) on board SVOM is dedicated to the rapid follow-up of the GRB counterpart in the 0.2-10 keV energy band. Making use of the localization capabilities of MXT, SVOM will implement a dedicated strategy to readily observe the potential X-ray counterparts to GW sources. To this aim, we developed an MXT point source science simulator and we tested the different localization algorithms and observation sequences (including sky tiling) to be implemented for a successful follow-up by MXT. Our tests consist in simulating the Swift/XRT X-ray afterglow database of short GRBs (which are among the most promising GW candidates) reselling their distance to z=0.1, and observing them with different delays with respect to the event.

Friday 2:00pm-2:30pm:

The Gravitational-wave Optical Transient Observer (GOTO)

Paul O'Brian

Abstract: We are developing a new, powerful facility designed to find the first optical counterparts to GW sources The Gravitational-wave Optical Transient Observer (GOTO).
http://goto-observatory.org/
Located on La Palma, GOTO will come on-line in summer 2017 and initially consist of 4 wide-field telescopes, to be expanded to 8 within 2017. GOTO will immediately respond to GW triggers and hunt for a new optical transient source. The gravitational wave skymaps are large and the challenge is how to search such large areas of sky efficiently. GOTO is specifically designed for this task, providing an instantaneous field of view (with 8 telescopes) of 36 square degrees. To provide a view of the night sky for comparison, GOTO will monitor the sky every night providing a unique, temporally-resolved view of the optical transient universe down to 21-22 magnitude. At these depths, GOTO data will enable a unique study of many classes of extragalactic and galactic sources.

Friday 2:30pm-3:00pm:

FAST Telescope: Current Status, Capabilities, Planned Projects, and LIGO collaboration

Marko Krco

Abstract: The Five Hundred Meter Spherical Aperture Radio Telescope (FAST) is quickly approaching operational status. With unprecedented sensitivity, we are beginning to make contributions to Radio Astronomy at 70MHz - 3GHz frequencies.

This talk will describe FAST's current status and capabilities, as well as describe some of our upcoming projects such as our multi-beam all-sky survey. Special focus will be given to our collaboration with LIGO/VIRGO, and how we plan to contribute with follow-up observations of GW events.

Friday 3:00pm-3:30pm:

A Simultaneous Search for GW-EM Counterparts at Low Frequencies with the All-Sky OVRO-LWA

Marin Anderson

Abstract: The Owens Valley Long Wavelength Array (OVRO-LWA) is a 288-element dipole array operating between 24 and 82 MHz, unique in its ability to image the entire viewable sky at high cadence with 10 resolution. This all-sky field-of-view (FOV), combined with high time and frequency resolution, makes OVRO-LWA the most sensitive instrument for characterizing transient populations below 100 MHz. In particular, the OVRO-LWAs continuous mode of operation, where data is streamed to a multi-day buffer, allows us to respond to all GW triggers within our FOV (a significant fraction of current aLIGO localization regions) by retrieving data that is not only concurrent with, but both precedes and follows, a GW event. These triggered observations with the OVRO-LWA are unprecedented at low frequencies, and are particularly critical for EM follow-up of neutron star mergers, for which a number of models predict a prompt pulse of bright, coherent, low frequency radio emission burst events.