

# UVI BurstCube

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---many collaborators.

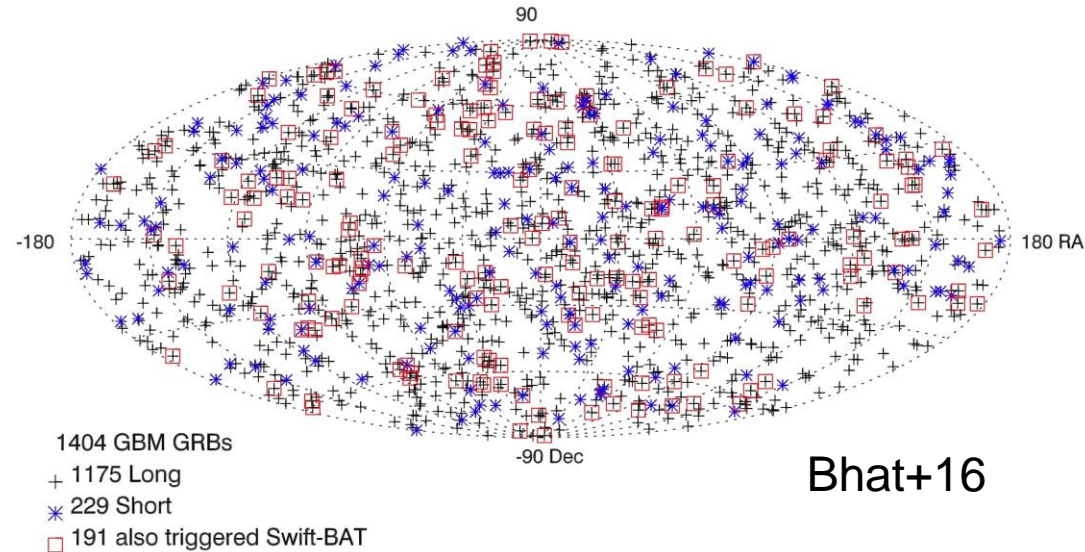
# The Science

- We live now in the epoch of Time-Domain astronomy
- We are also at the verge of multi-messenger astronomy
- New satellite concepts like the Neil Gehrels Swift Observatory (**Swift**) and **Fermi** have revolutionized the way we look at the transient sky

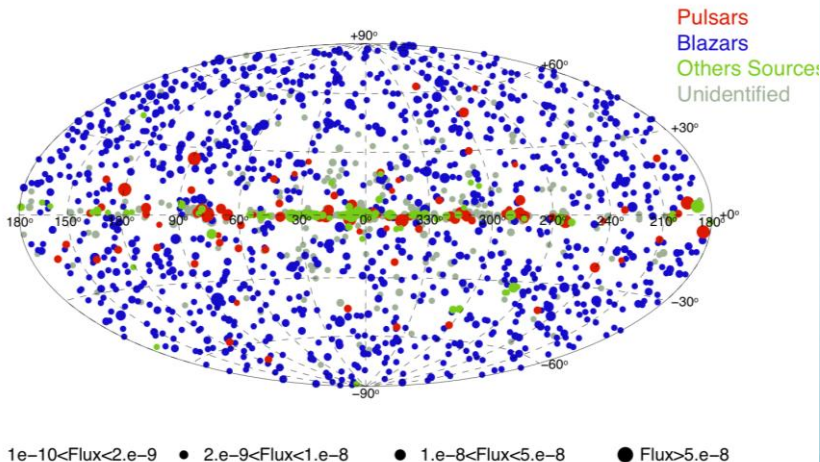
# The Transient Sky

- 30% of GRBs are Short GRBs
- Distribution is isotropic
- Only a fraction of them have ground-based follow-up
- Synergy between LAT-GBM and Swift/BAT

Fermi GBM GRBs in first six years of operation



Fermi Gamma-ray Space Telescope  
The LAT  $\gamma$ -ray sky (second year catalog)

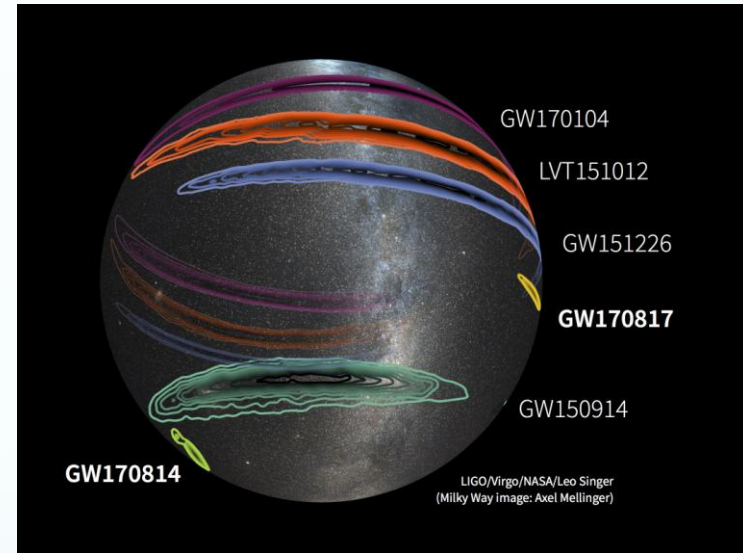
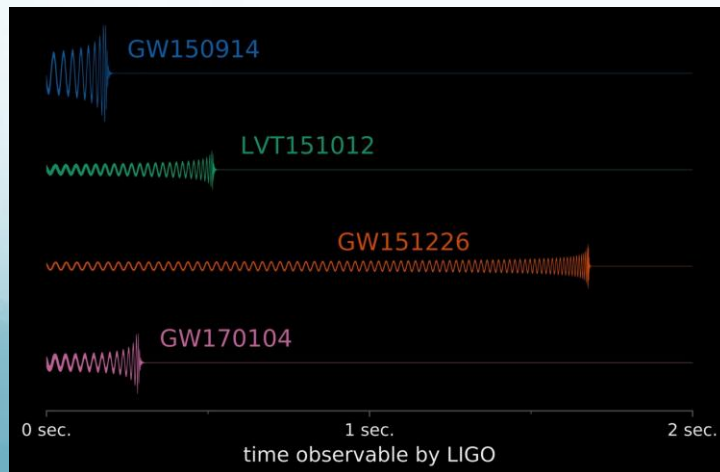


- Many known sources have been monitored
- Many **unknown sources have been discovered**
- Public data allow “data-mining” and ground-based follow-up

# Gravitational Waves

Short GRBs are progenitors of GW emission. The current effort has demonstrated the need of:

- All-sky coverage
- Rapid response
- Accurate localization
- Multiwavelength rapid follow-up



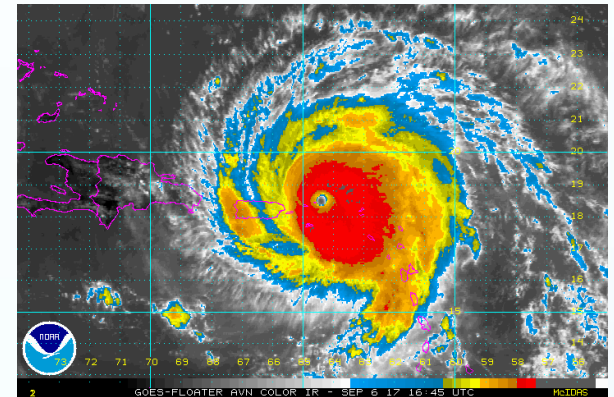
# UVI BurstCube

- 3U Cubesat concept in development at the University of the Virgin Islands
- 10 keV to 1MeV energy range
- CsI crystals + array of low-voltage SiPMs
- Aim to provide time and spectral information
- Possible gross localization (in development)
- 60% duty cycle (low-orbit)
- Expect >6 sGRBs/yr (>20 long GRBs/yr)
- **Chances of 1 sGRB-GW event per year (joint with other CubeSats)**

# UVI BurstCube - status

The 2017 hurricanes that hit the U.S. Virgin islands pushed back the development for the first part of the 2018.

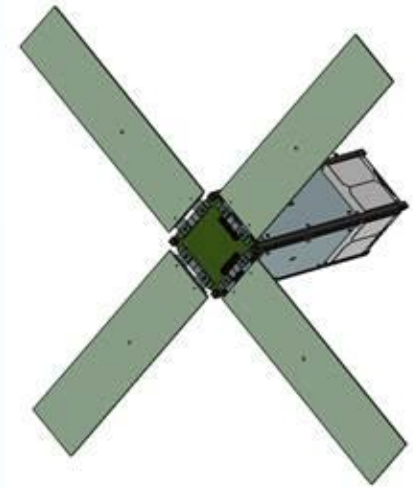
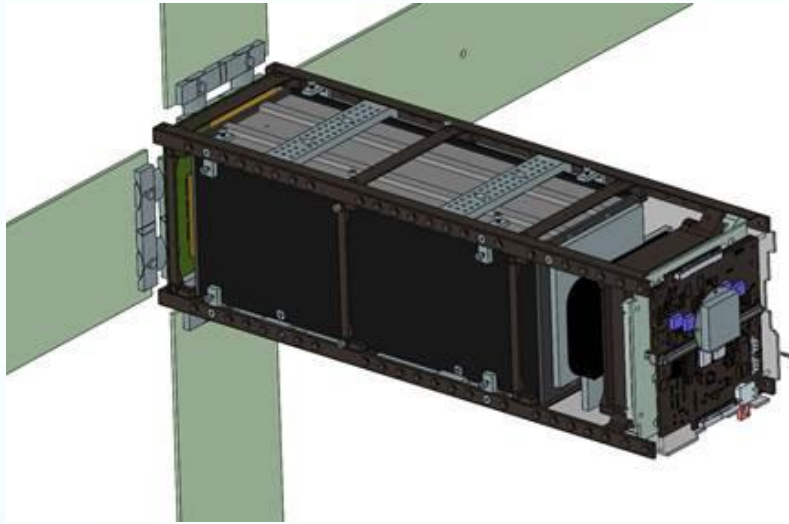
- Since March we have been collaborating with NASA-GSFC and the Burscube team(PI Perkins)
- We have been investigating possible 3U configurations (coll. De Nolfo –NASA-GSFC)
- We have been put in orders for crystals/SiPMs
- We have been working on Geant simulations



Spetember 12<sup>th</sup>, 2018



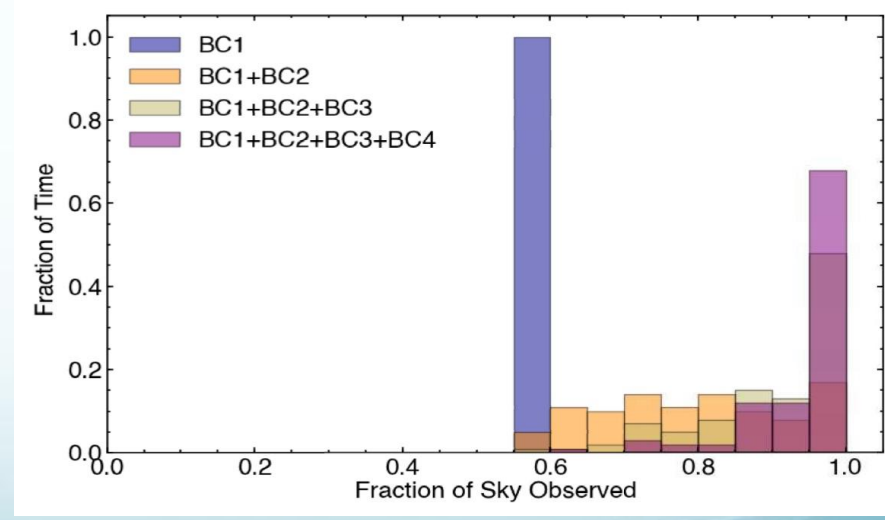
# UVI BurstCube - status



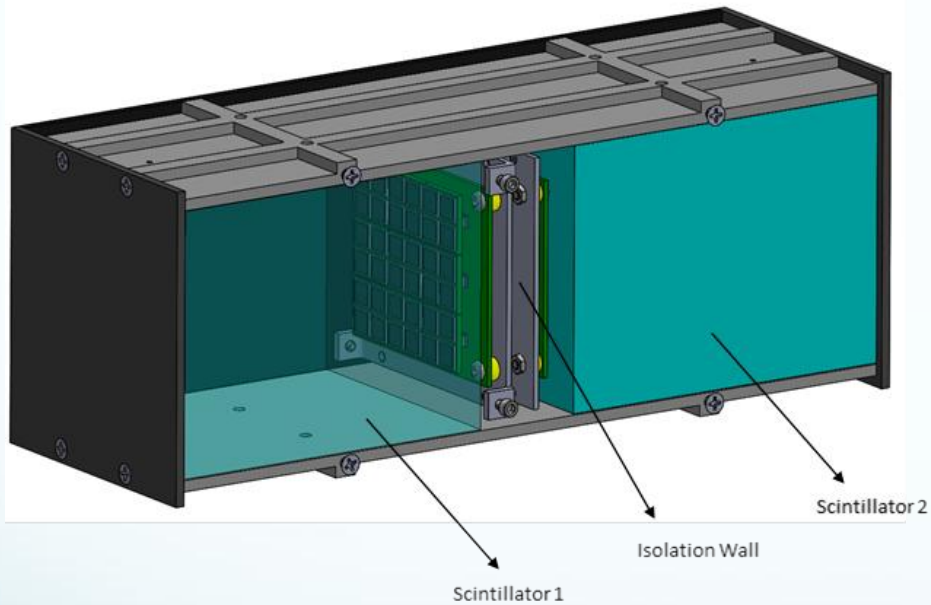
Possible design (from Iker Liceaga)

Sky coverage with a single Burstcube vs. a constellation of similar nanosats.

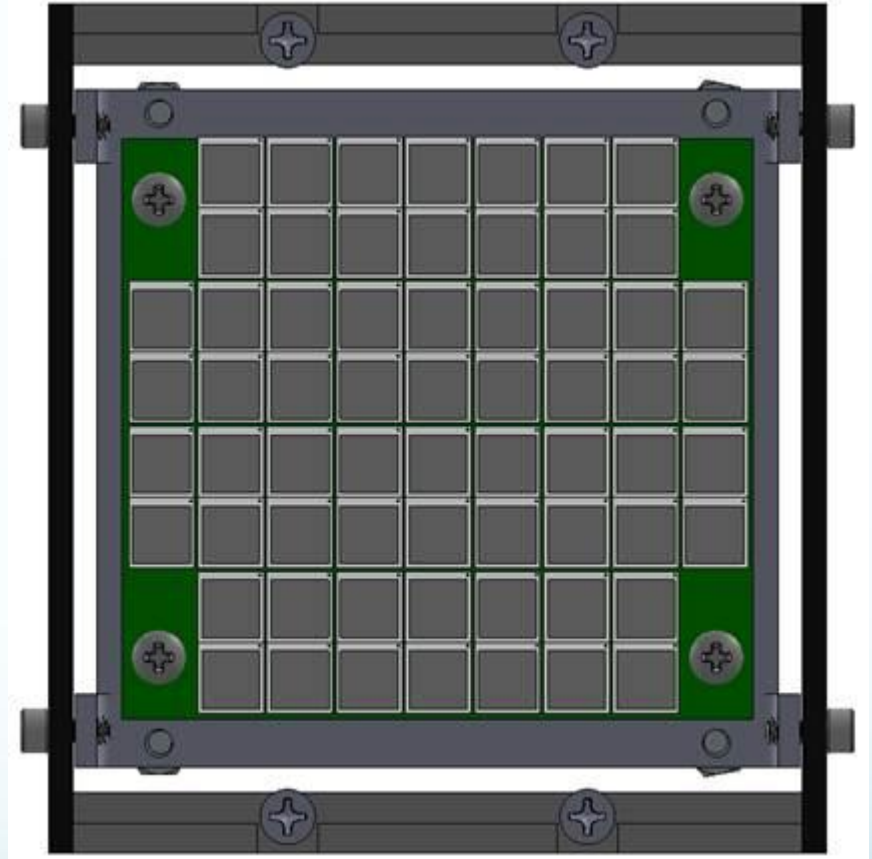
A series of 4 cubesats may provide almost 100% sky coverage.



# UVI BurstCube - status



Possible 2-crystal configuration,  
with absorbing material between  
boards



Board filled with SiPMs (2x2 mm)  
to maximize photon collection  
(Hamamatsu)



# UVI BurstCube – towards 2022

- We have requested quotes and parts for lab testing (to be started in 2019)
- We are moving forward with the final design decision (hopefully by end 2018)
- We are hiring a cubesat-experienced postdoc
- We will continue working with simulations

# UVI BurstCube – towards 2022

- Lab testing on the Crystals (CsI, NaI) (2019)
- Lab testing on SiPMs (2019)
- Finally set on a configuration
- Power consumptions tests
- Solar panels studies

UVI BursCube is been developed by 2 UVI faculty and a group of undergraduate students.

It is a great opportunity to merge the **educational component** with top of the **line short time-scale research** (students see some final products during their 4-years at UVI).

Great for Physics/Astronomy and **Engineering** students.



**Thank you!!**

**See you all in the US Virgin Islands?**

**GW theorist**

