

WG2 summary

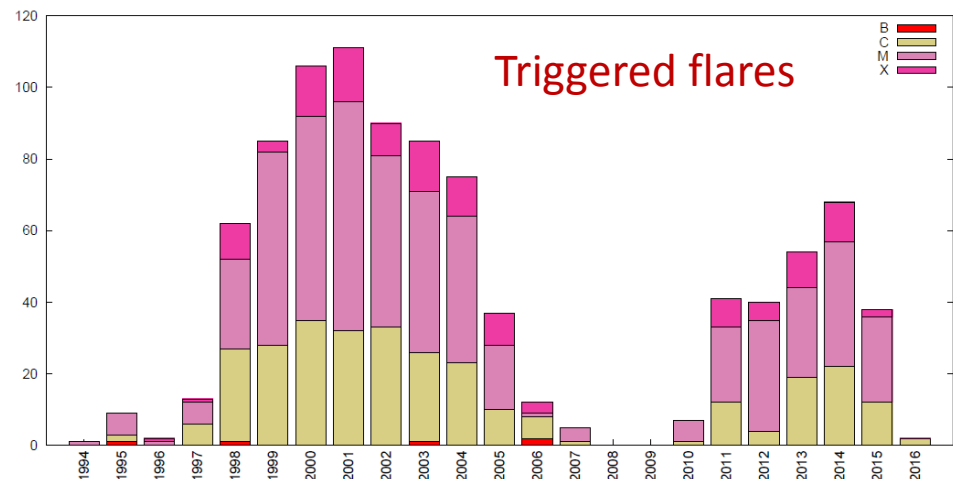
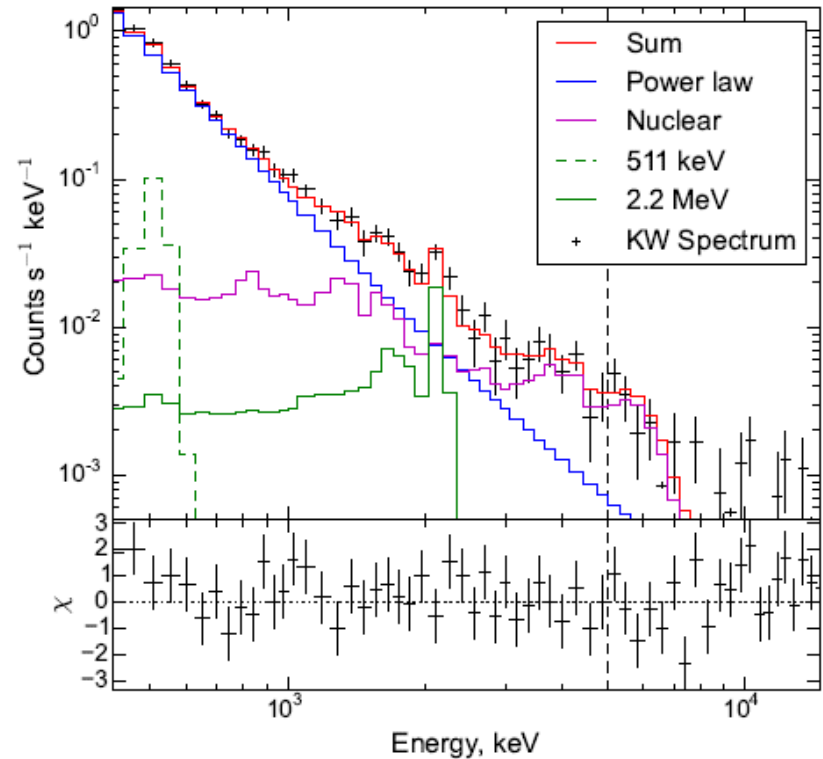
Albert Y. Shih

2016 July 30

2010 June 12

Konus on *Wind*

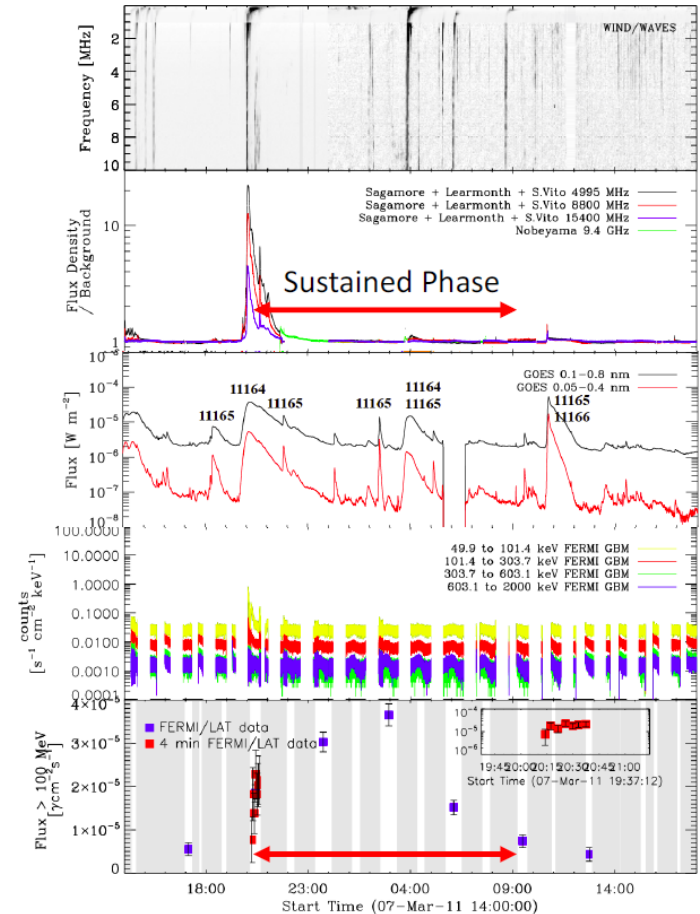
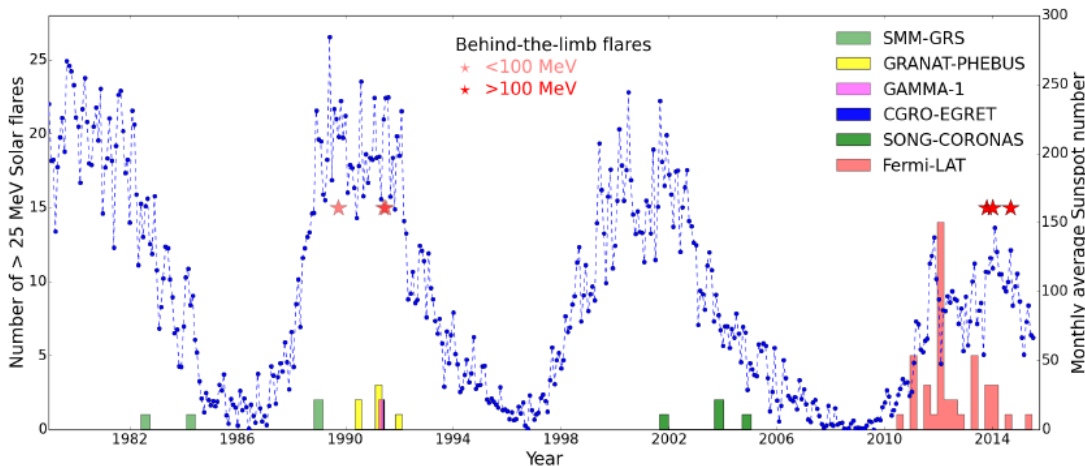
- Since November 1, 1994!
- Two NaI(Tl) detectors
 - ~20 keV to 15 MeV
 - Continuous in-flight calibration from 511 keV line and ^{40}K line
- >1000 solar flares in triggered mode
 - Time bins down to 2 ms
 - Additional flares in “waiting” modes



<http://www.ioffe.ru/LEA/KWSFD/>

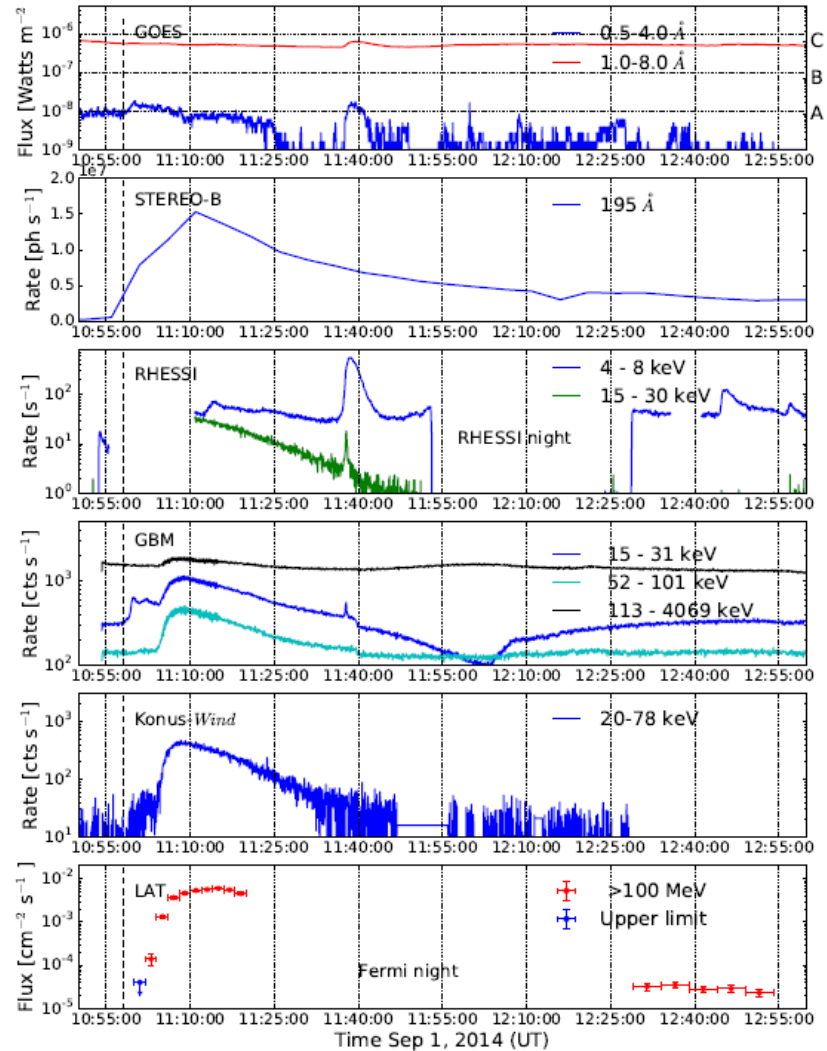
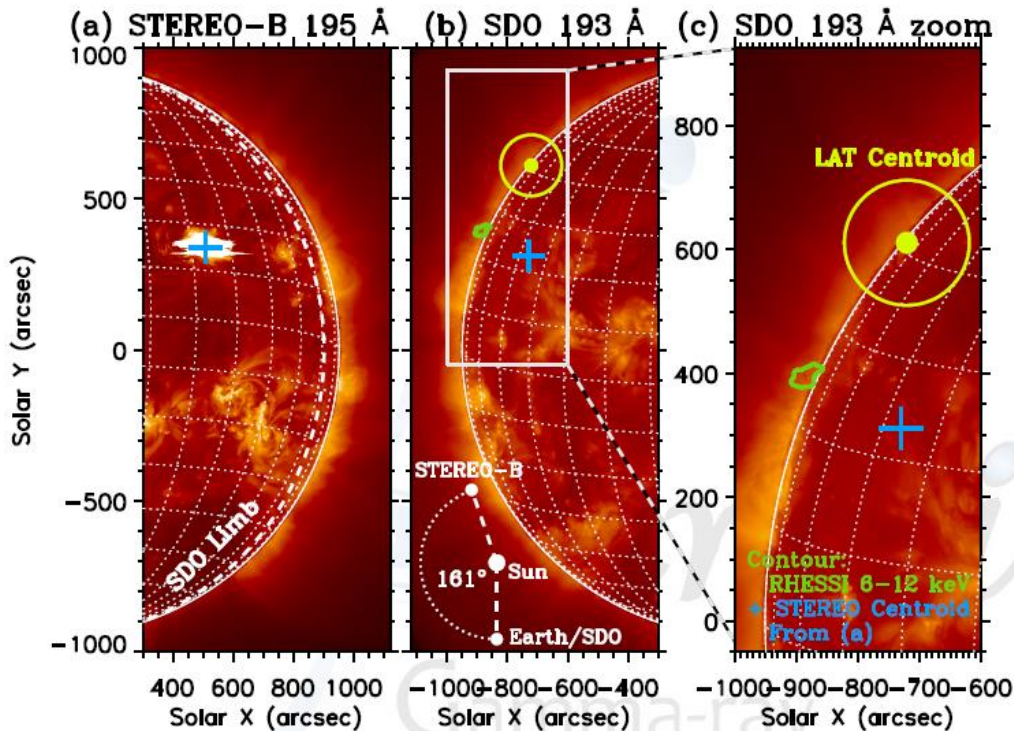
Long-duration gamma-ray flares

- *Fermi*/LAT
 - 20 MeV to 300 GeV
 - More than 40 flares in 8 years
- LDGRFs
 - Extended >100 MeV emission of many hours from M-class flares!
 - Association with fast CMEs
- Signatures in radio?



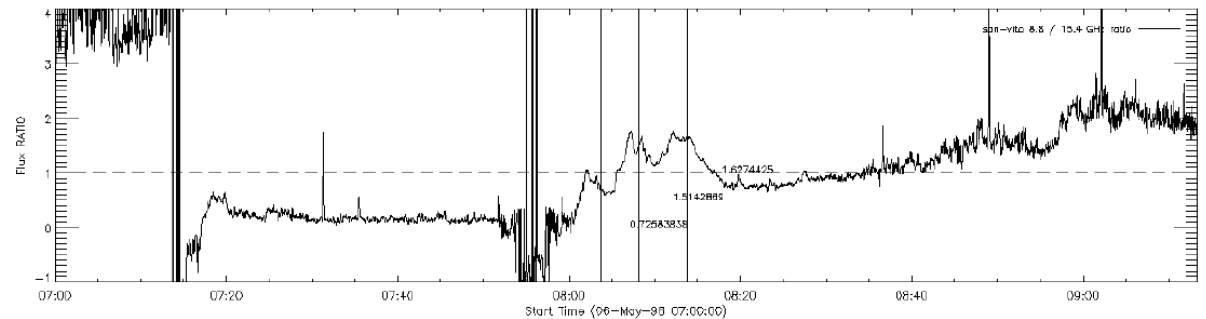
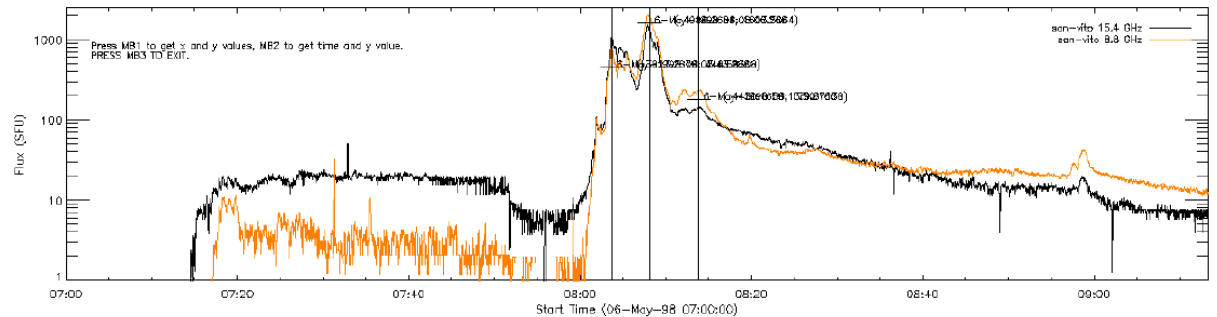
Over-the-limb gamma-ray flares

- 2014 Sep 1, ~X2 estimated
 - ~40° behind east limb
 - Size of >15 keV source greater than 3 arcmin



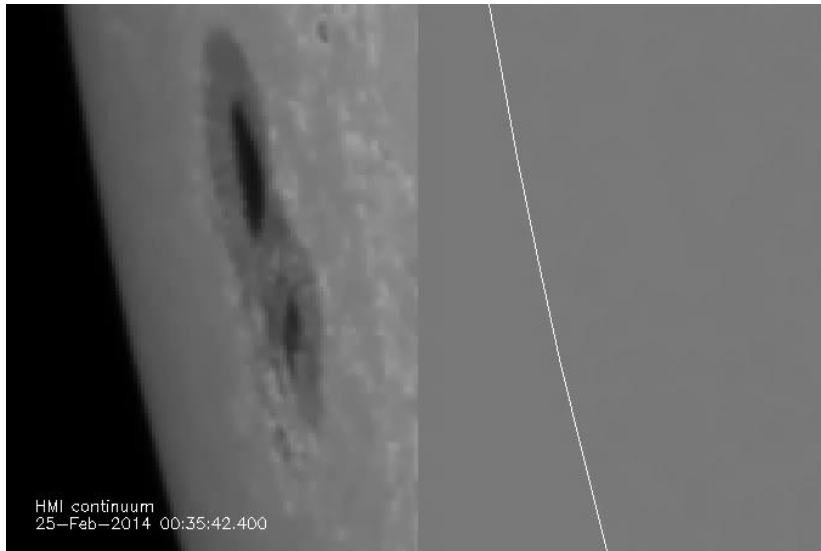
Forecasting SEP spectra

- Correlation between SEP spectral index and ratio of microwave emission at 9 GHz to 15 GHz
- Improvements from identifying thermal events and multiple-peak events

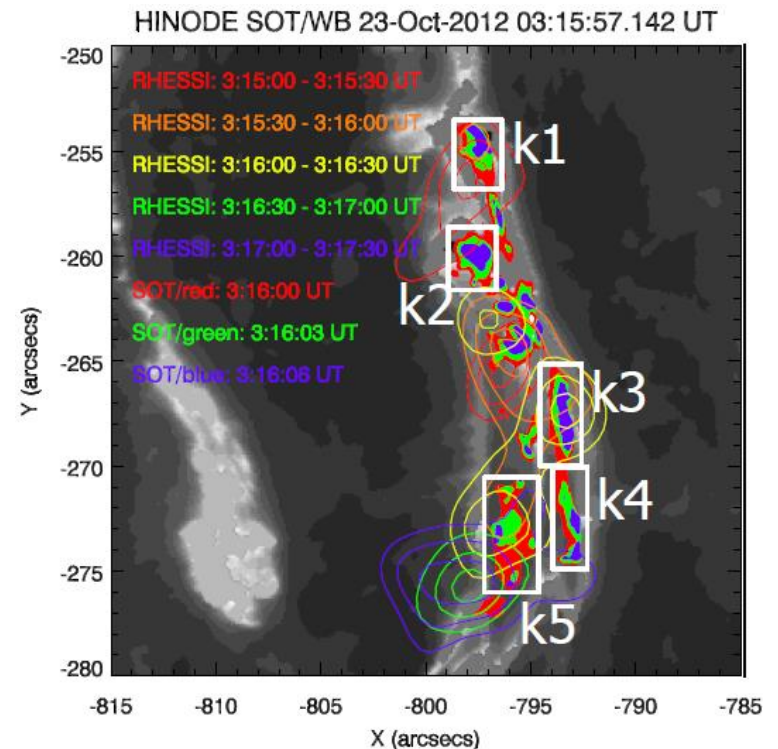


White-light flares

- 2014 Feb 25, X5
 - Fermi (GBM and LAT), RHESSI, NoRP/NoRH/RSTN, AIA, EVE MEGS-A, STEREO-B
 - Enough statistics to study evolution of ion-associated emission

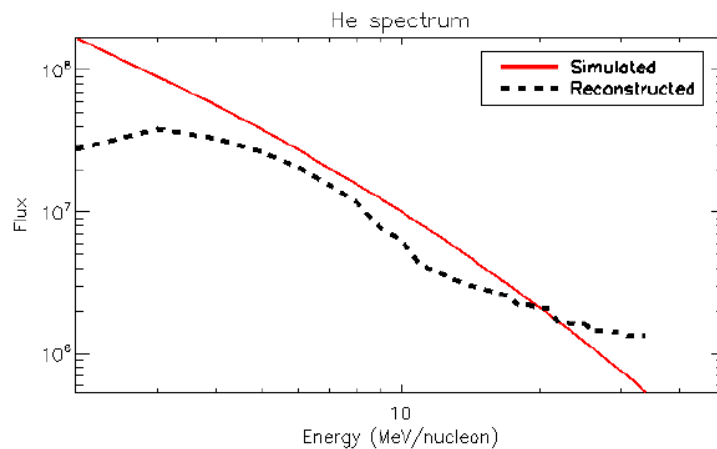
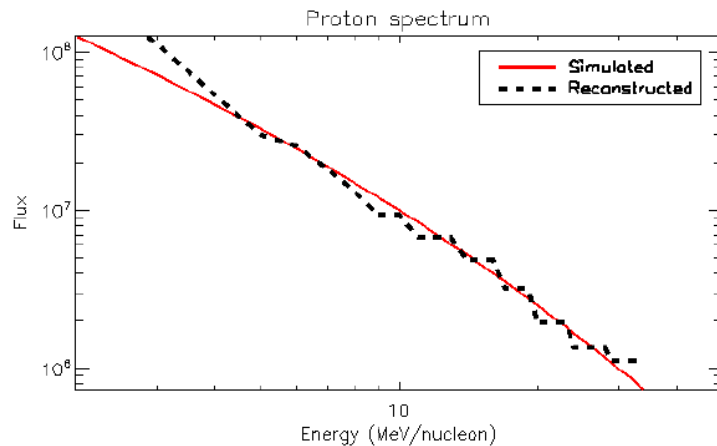


- What produces white light?
 - Proton beams
 - Chromospheric electrons

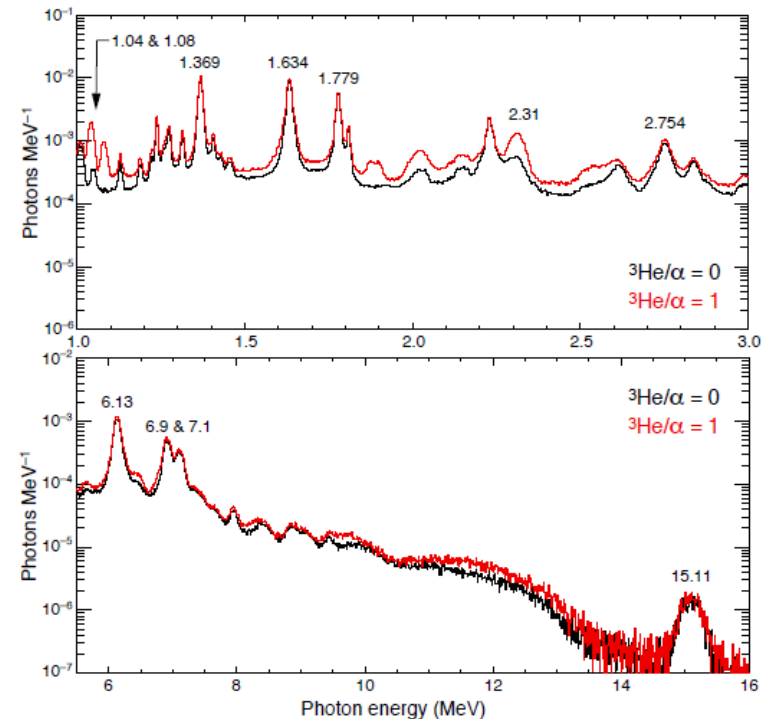


Ion spectra and abundances

- Non-parameterized spectral inversion

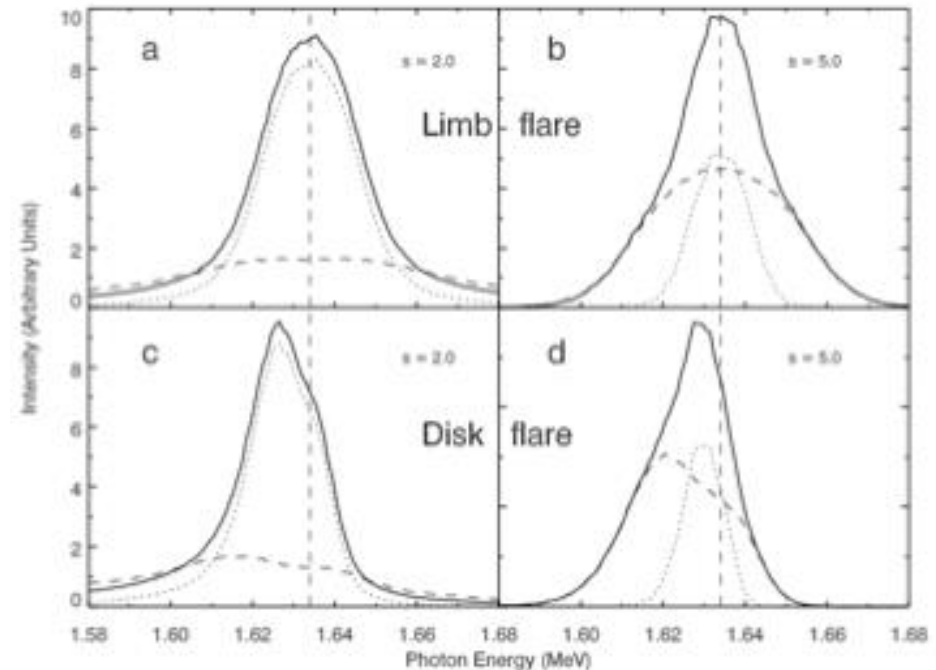


- Nuclear de-excitation line code updated with >100 ^3He reactions
- Preliminary analysis of *SMM/GRS* data shows enhanced $^3\text{He}/^4\text{He}$ ratios at $\sim 4\text{-}\sigma$ level



Ion angular distribution

- Revisit of apparent non-radial angular distribution for 2002 July 23
 - Smith et al. (2003) still holds up!
 - Suggests tilt of magnetic field towards observer
- Redshifts of lines need to be added to spectral-inversion code



WG2 Contributors

Wednesday afternoon

- **Alexandra Lysenko** – “KWSFD – the Konus-Wind Hard X-ray Solar Flares Database”
- **Melissa Pesce-Rollins** – “Fermi Large Area Telescope observations of high-energy gamma-ray emission from solar flares”
- **Säm Krucker** – “RHESSI and AIA observations of the FERMI behind-the-limb flare on 2014 September 1”
- **Alec MacKinnon** – “SOL2014-02-25: An amazing gamma-ray and white-light event”
- **Pietro Zucca** – “Microwave observations and the nature of high-energy solar gamma-ray events and on predicting SEP spectrum”

Friday afternoon

- **Kyoko Watanabe** – “Statistical approach for the origin of white-light emission of white-light flares”
- **Federico Benvenuto** – “The determination of high energy particle spectra via gamma ray regularized inversion”
- **Wei Chen** – “Time observation of de-excitation line shapes in solar flare”
- **Ron Murphy** – “Evidence for enhanced accelerated ^3He in solar flares from gamma-ray spectroscopy”