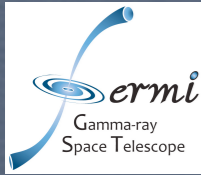




Max-Planck-Institut
für Radioastronomie



GAMMA PROJECT



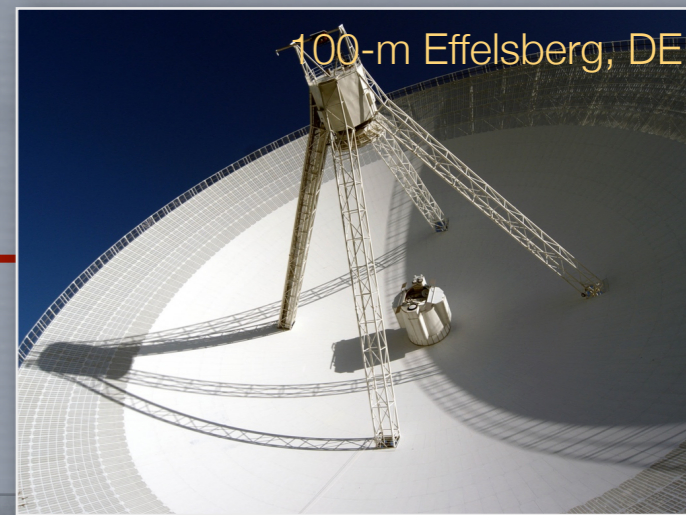
GLAST
AGN
MULTI-FREQUENCY
MONITORING
ALLIANCE

F-GAMMA project:

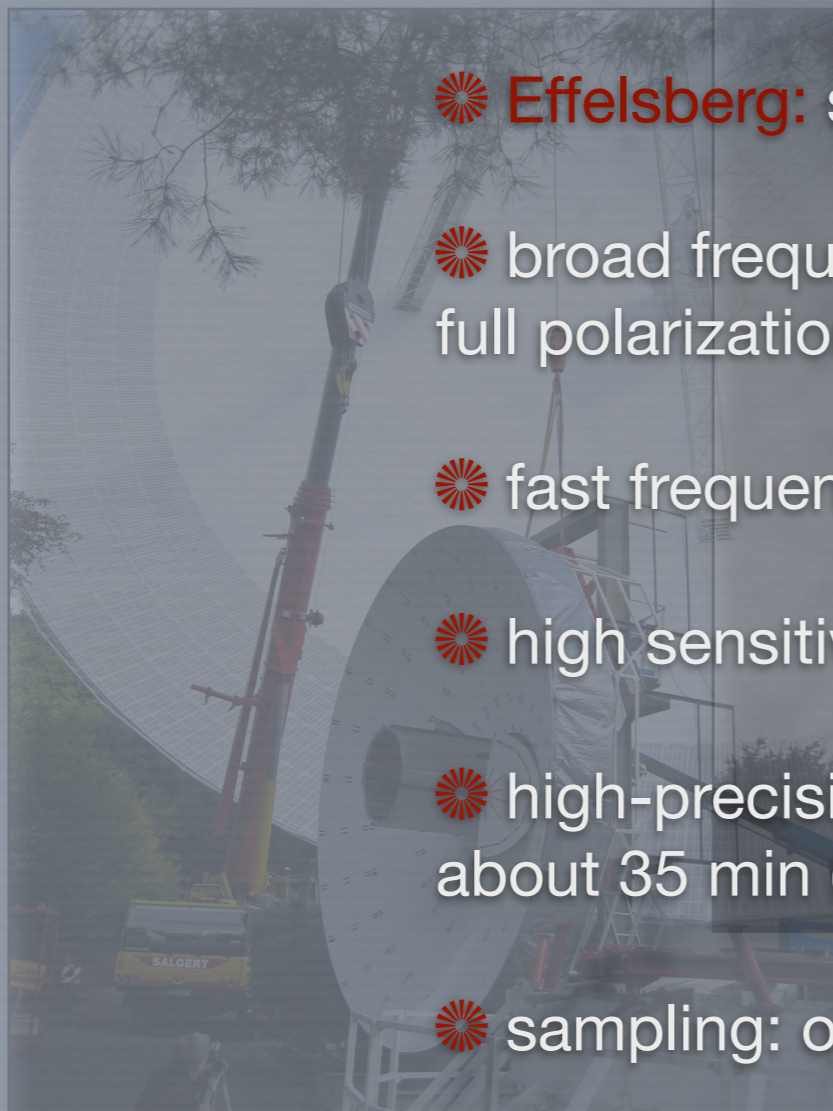
Fermi-GST AGN Multi-frequency Monitoring Alliance



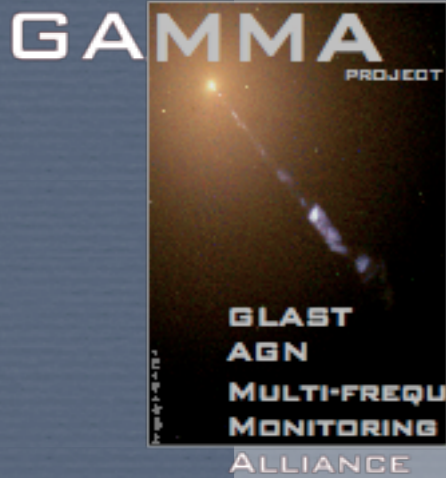
new Fermi related monitoring effort: The Effelsberg and IRAM program



new Fermi dedicated, quasi-simultaneous broad band (2.6 to 270 GHz) monitoring of a selected blazar sample (61 sources)



- ☀ Effelsberg: start January 2007
- ☀ broad frequency coverage between 11cm and 7mm full polarization information for many frequencies
- ☀ fast frequency switching capabilities (~sec)
- ☀ high sensitivity (new sub-reflector in 2006)
- ☀ high-precision, (quasi-) simultaneous broad band spectra in about 35 min (~ 0.5 - 1 Jy source, 1 to a few percent accuracy)
- ☀ sampling: one epoch every 3-4 weeks over the next years

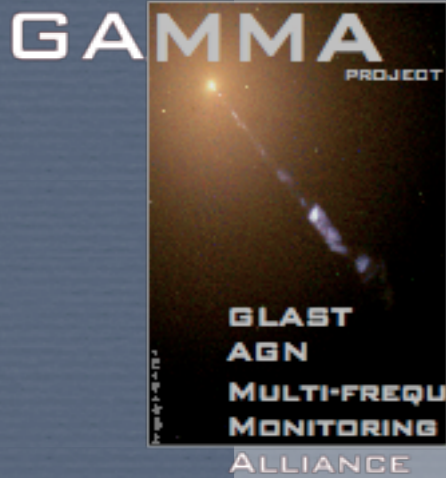


MW campaign: MRK 501 - PIC: March 20 - May 26, 2008

using all secondary focus heterodyne receivers in total power and polarization mode:

| Frequency (GHz) | FWHM (arcsec) | Sensitivity (K/Jy) | Polarization | T _{sys} (K) |
|-----------------|---------------|--------------------|--------------|----------------------|
| 2.64 | 260 | 1.5 | LCP / RCP | 17 |
| 4.85 | 145 | 1.5 | LCP / RCP | 27 |
| 8.35 | 81 | 1.3 | LCP / RCP | 23 |
| 10.45 | 67 | 1.4 | LCP / RCP | 55 |
| 14.60 | 50 | 1.1 | LCP / RCP | 50 |
| 23.05 | 36 | 0.8 | LCP / RCP | 70 |
| 32* | 25 | new | LCP / RCP | 55 |
| 43.00 | 21 | 0.6 | LCP / RCP | 90 |

*new 7-beam receiver (installed in Feb. 2008)



new Fermi related monitoring effort: The Effelsberg and IRAM program

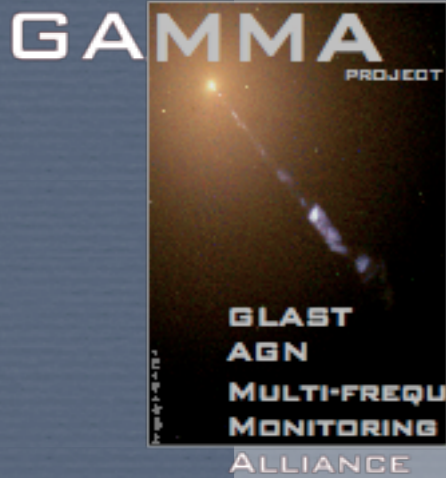


- ☀ extension of the Effelsberg monitoring towards the mm bands: the **IRAM 30-m telescope on Pico Veleta, Spain**
- ☀ sensitive heterodyne receivers at 3, 2, 1 mm simultaneously (total intensity)
- ☀ **since June 2007:** monthly observations at 86, 140, 230, 270 GHz highly coordinated with Effelsberg (in close collab. with IRAM); four RX receivers simult.
- ☀ same source sample of 61 sources: **synergy with existing IRAM programs** (37 sources in TP monitoring of Ungerechts et al.; about 25 sources in POL monitoring, Thum et al.)
- ☀ provides **quasi-simultaneous frequency coverage of 2.3 to 270 GHz (11 cm to 1 mm) plus polarization (Helmut's talk)**
- ☀ cross-scans plus calibration scans (sky/ambient/cold) per source; frequent calibrators (e.g. planets)
- ☀ **5 -10 % accuracy; data reduction in progress**



new Fermi related monitoring effort: The Effelsberg and IRAM program

| Source | RA-DEC (J2000) | Remarks | Source | RA-DEC (J2000) | Remarks |
|-------------------------|----------------------|---------|-------------------------|----------------------|---------|
| 0003-066 | 00:06:13.9 -06:23:35 | | 1128+592 | 11:28:13.0 +59:25:15 | |
| 0059+581 | 01:02:45.8 +58:24:11 | | 1219+285, WCom, ON231 | 12:21:31.7 +28:13:59 | |
| 0215+015, PKS0215+015 | 02:17:49.0 +01:44:50 | | 1222+216, 4C21.35 | 12:24:54.5 +21:22:46 | |
| 0219+428, 3C66A | 02:22:39.6 +43:02:08 | | 1226+023, 3C273 | 12:29:06.7 +02:03:09 | |
| 0234+285, 4C28.07 | 02:37:52.4 +28:48:09 | | 1228+126, M87 | 12:30:49.4 +12:23:28 | |
| 0235+164, AO0235+16 | 02:38:38.9 +16:36:59 | | 1253-055, 3C279 | 12:56:11.2 -05:47:22 | |
| 0238-084, NGC1052 | 02:41:04.8 -08:15:21 | | 1308+326, OP313 | 13:10:28.7 +32:20:44 | |
| 0300+470, 4C47.08 | 03:03:35.2 +47:16:16 | | 1406-076, PKS1406-076 | 14:08:56.5 -07:52:27 | |
| 0316+413, 3C84 | 03:19:48.2 +41:30:42 | | 1426+428, H1426+428 | 14:28:32.7 +42:40:21 | |
| 0317+185, 1E0317.0+1835 | 03:19:51.8 +18:45:34 | | 1510-089, PKS1510-08 | 15:12:50.5 -09:05:60 | |
| 0333+321, OE355 | 03:36:30.1 +32:18:29 | | 1544+820, 1ES1544+820 | 15:40:16.0 +81:55:06 | |
| 0336-019, PKS0336-01 | 03:39:30.9 -01:46:36 | | 1611+343, OS319 | 16:13:41.1 +34:12:48 | |
| 0355+508, NRAO150 | 03:59:29.7 +50:57:50 | | 1633+382, 4C38.41 | 16:35:15.5 +38:08:05 | |
| 0415+379, 3C111 | 04:18:21.3 +38:01:36 | | 1641+399, 3C345 | 16:42:58.8 +39:48:37 | |
| 0420-014, PKS0420-01 | 04:23:15.8 -01:20:33 | | 1652+398, Mkn501 | 16:53:52.2 +39:45:37 | |
| 0430+052, 3C120 | 04:33:11.1 +05:21:16 | | 1730-130, NRAO530 | 17:33:02.7 -13:04:50 | |
| 0502+675, 1ES0502+675 | 05:07:56.3 +67:37:24 | | 1803+784, S51803+78 | 18:00:45.7 +78:28:04 | |
| 0528+134, PKS0528+134 | 05:30:56.4 +13:31:55 | | 1807+698, 3C371 | 18:06:50.7 +69:49:28 | |
| 0716+714, S50716+71 | 07:21:53.4 +71:20:36 | | 1823+568, 4C56.27 | 18:24:07.1 +56:51:01 | |
| 0735+178, PKS0735+17 | 07:38:07.4 +17:42:19 | | 1957+40, CygA | 19:59:28.4 +40:44:02 | |
| 0748+126 | 07:50:52.0 +12:31:05 | | 1959+650, 1ES1959+650 | 19:59:59.9 +65:08:55 | |
| 0814+425, TXS0814+425 | 08:18:16.0 +42:22:45 | | 2155-152, PKS2155-152 | 21:58:06.3 -15:01:09 | |
| 0827+243, OJ248 | 08:30:52.1 +24:10:60 | | 2155-304, PKS2155-304 | 21:58:52.0 -30:13:32 | |
| 0836+710, S50836+71 | 08:41:24.4 +70:53:42 | | 2200+420, BLLac | 22:02:43.3 +42:16:40 | |
| 0851+202, OJ287 | 08:54:48.9 +20:06:31 | | 2201+315, 4C31.63 | 22:03:15.0 +31:45:38 | |
| 0954+658, S40954+65 | 09:58:47.2 +65:33:55 | | 2223-052, 3C446 | 22:25:47.3 -04:57:01 | |
| 1038+064, PKS1038+064 | 10:41:17.2 +06:10:17 | | 2230+114, OY150, CTA102 | 22:32:36.4 +11:43:51 | |
| 1101+384, Mkn421 | 11:04:27.3 +38:12:32 | | 2251+158, 3C454.3 | 22:53:57.7 +16:08:54 | |
| 1127-145, PKS1127-14 | 11:30:07.1 -14:49:27 | | 2344+514, 1ES2344+514 | 23:47:04.8 +51:42:18 | |
| 1133+704, Mkn180 | 11:36:26.4 +70:09:27 | | 2345-16, PKS2345-16 | 23:48:02.6 -16:31:12 | |
| 1156+295 | 11:59:31.8 +29:14:44 | | | | |



new Fermi related monitoring effort: The Effelsberg and IRAM program

0235+164:

☀ **Effelsberg/IRAM PV:** broad band data/spectra obtained in August/September/October (2.6 - 270 GHz):

- ☀ 2008-08-22/26
- ☀ 2008-09-16/17
- ☀ 2008-10-09/17

☀ **APEX:** first data obtained in October - fortunately also for 0235+164 (350 GHz) !

- ☀ 2008-10-06