



# Survey of the Galactic Polarized Emission in Portugal

## Project Status

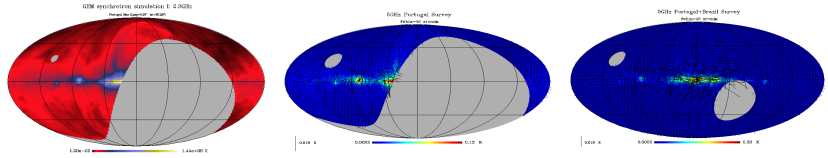
instituto de telecomunicações



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The Galactic Emission Mapping - GEM collaboration is proceeding towards the survey of the polarized emission at 5GHz of the whole sky from antennas located in Portugal - covering the North Hemisphere - and Brazil - covering the South Hemisphere. The obtained maps will be used in the subtraction and component separation of the galactic foreground emission to the Cosmic Microwave Background observations carried by the ESA Planck Surveyor mission (ESA launch by 2009) and other future CMB probes for CMB B-mode detection.

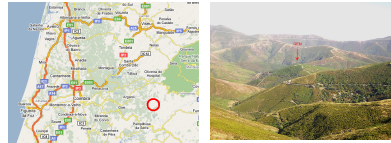


2.3 GHz and 5 GHz Portugal and Brazil surveys simulations. This will provide excellent contributions for galactic synchrotron and spinning dust emission precise cartography and analysis.



GEM-P is installing a 9-m dish antenna, (central Portugal), equipped with a new low noise receiver.

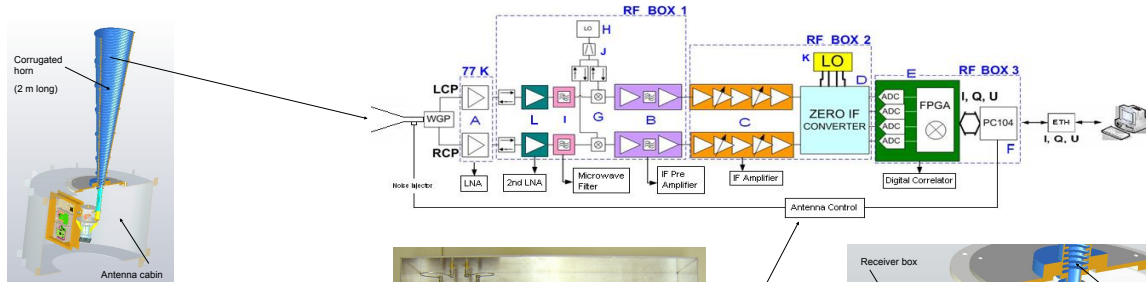
Weight: 5 Ton  
Diameter: 9 m  
Fast scan (<1 rpm) at constant elevation (~ 60°)  
Ground screens to control stray ground radiation and RFI  
Resolution ~ 0.7°



GEM-P antenna installed on site and a view from a nearby hill.

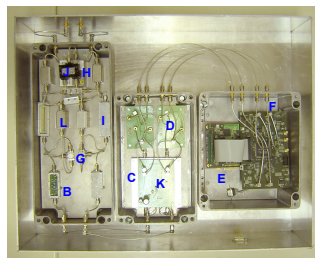
GEM site ( Fajão – Pampilhosa da Serra )

### Digital Superheterodyne Correlator Receiver

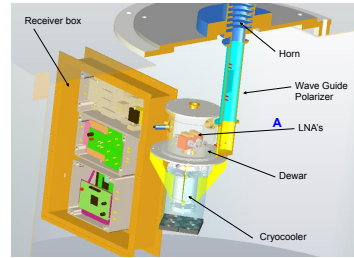


**GEM-P System:**  
Tsys < 20 K  
B = 200 MHz (to be expanded to 400MHz)  
G = -105.6dBm  
FWHM=45 arcmin  
Target sensitivity= <0.3mK/beam  
INP LNAs from Low Noise Factory (Chalmers)  
Full base-band Complex Digital correlator implemented on a FPGA - outputs I, Q, U Stokes parameters.

► Provides good testing for future spinning dust mapping at 10-15GHz surveys:  $n^{2-8}$  implies high bandwidth and/or multi-beams to achieve target sensitivities


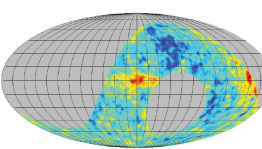


Receiver box (non cryogenically cooled components and the digital complex correlator).



Receiver system inside the antenna cabin, showing the dewar with the cryogenic cooled INP LNAs and the Sunpower cryocooler.

### GEM Project in Brazil

**GEM site in Brazil and the first results of the polarized galactic emission at 5GHz.**

**Apoios:**



POCTI/FNU/42263/2001  
POCI/CTE-AST/57209/2004



Works on GEM site, ground preparation, antenna and ground shield foundations, fence and electrical power, kindly provided by Câmara Municipal de Pampilhosa da Serra.

- Links:**
- <http://www.av.it.pt/gem/>
  - <http://centra.ist.utl.pt/>
  - <http://cosmos.lbl.gov/>
  - [http://www.das.inpe.br/cosmo/index\\_gem.htm](http://www.das.inpe.br/cosmo/index_gem.htm)