compreensão de fenômenos em regiões ativas e explosões.Um novo sistema para estas medidas foi desenvolvido para a região IV-médio do espectro, centrado em 30 THz, fazendo uso de uma câmera com uma matriz de microbolômetros em seu plano focal para a qual foi projetado um arranjo óptico composto de três espelhos, côncavo-convexo-côncavo que propicia um aumento da imagem solar projetada, atenua o brilho incidente no campo de visão da câmera (16x21 graus, obtido com lente de Ge), permitindo um ajuste afocal da imagem solar na matriz de sensores. As primeiras observações foram feitas no Observatório Bernard Lyot, Campinas, onde foram desenvolvidas técnicas para a caracterização da câmera e calibração das medidas em temperatura de brilho e fluxo. Observações subseqüentes foram realizadas no Complexo Astronômico de El Leoncito, San Juan, Argentina, onde o céu apresentou excelente qualidade de transparência para estas freqüências. Os primeiros resultados confirmaram a presença de "plage-like" regions, ao redor das manchas solares, previstas por Turon et al. (1970) e outros autores. A análise de imagens com taxa de 10 frames por segundo indicaram pela primeira vez a presença de eventos rápidos apresentados como regiões puntualmente brilhantes com duração aproximada de alguns segundos, com densidades de fluxo da ordem de milhares de SFU (1 SFU = 10 22 W/m2Hz) ocorridos durante eventos em Raios X moles de pequena intensidade detectados pelo GOES.

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STUDY OF MAGNETIC FIELDS IN SOLAR ACTIVE REGIONS FROM RADIO OBSERVATIONS

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In this work we present the results of our 3-D atmospheric model over solar active regions. Active regions are sites of increased magnetic fields in the solar atmosphere. Our model considers the temperature and densities (electrons and ions) distributions with height, as well the local magnetic 3-D structure. To obtain the positions and intensities of magnetic field lines in the solar atmosphere, we made force-free extrapolations of the magnetic field from the intensities measured in the MDI (SOHO) magnetograms, which present the mean photospheric magnetic field intensity with a resolution of about 2 arcsec. This procedure resulted in three data cubes with magnetic field intensities, one for each vector component. Magnetic loops are simulated by filling the region around each magnetic field line with densities and temperature values distinct from those of the quiet solar atmosphere. Thus, the atmospheric region is formed by the presence of flux tubes. For each column of the cube representing the atmosphere, the equations of radiative transport were solved considering bremsstrahlung and gyro-resonance emission at 17 GHz. This procedure yields 2-D matrices of brightness temperature, that were compared with the observational results at 17 GHz taken by the Nobeyama Radioheliograph (NoRH). The results showed that in faint non-polarized active regions (T_B=5×10^4 K), the gyro-resonance emission is negligible compared to the bremsstrahlung contribution, that is independent of magnetic field intensities. On the other hand, for a polarized active region with brightness temperature T_B=4×10^5K, the gyro resonance became very important for the total 17 GHz emission. Nevertheless, our model showed that the gyro-resonance emission calculated from the magnetic field extrapolation obtained from the MDI magnetograms is totally absorbed by solar atmosphere. To overcome this problem we solved the transfer equations with magnetic field concentrations similar to other results present in the literature. Here, we set the fine structures of flux tubes with magnetic field intensities about twice the values showed in the magnetograms.

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ELECTRON SPATIAL DISTRIBUTION DUE TO MAGNETIC MIRRORING IN 3D SOLAR BURST SOURCE

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It is commoly believed that the microwave and X-ray emission from solar flares are produced by the same mildly relativistic electron population. The spatial and spectral characteristics of the emission are determined by the electron energy distribution, and also by the source magnetic field intensity and geometry. The spatial distribution of the accelerated electrons is determined by the electron energy and pitch-angle distributions, source magnetic field (magnetic mirroring) and, other effects that cause changes in the electron distribution characteristics, as Coulomb collisions and pitch-angle diffusion. As a first approach, we investigated the effects of magnetic mirroring in the electron spatial distribution in a 3D source. We used an idealized 3D magnetic field, with a loop geometry and spatially varying magnetic intensity. The spatial distribution was evaluated for an isotropic pitch angle distribution of electrons. Considering only the adiabatic invariance and the electrons pitch-angles, the spatial distribution was determined. Thus, we can calculate the gyrosynchrotron emission produced by the ensemble of electrons and compare the results with the emission of a spatially homogeneous electron distribution through the source. The resulting microwave spectra show slightly steeper optically thin spectral indices, which is result of the lower electron density in the footpoints of the loop. Some minor effects were also noted in the optically thick region of the spectra. The morphology and size of the emitting area of flux density maps evidence the effect of spatial electron distribution in sources on three different positions on the solar