PAINEL 166

LABORATÓRIOS DE INSTRUMENTAÇÃO DO LNA

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Já há algum tempo está claro para a comunidade astronômica brasileira que o desenvolvimento de instrumentação astronômica é necessário para impulsionar a astrofísica observacional (por ex. projeto Instituto do Milênio MEGALIT). O LNA, reconhecendo esta necessidade, tem colocado o desenvolvimento instrumental como uma de suas prioridades (indicada já no Relatório Tundisi e agora corroborada no Planejamento Estratégico do LNA). Com a inauguração do novo prédio de laboratórios financiado pelo CT-Infra (FINEP/MCT) estamos consolidando nossa capacidade de desenvolvimento de instrumentação. Neste trabalho apresentamos os aspectos técnicos e capacidades dos laboratórios (já operacionais ou em implementação) de caracterização óptica, eletrônica e controle, fibras ópticas, oficina e metrologia mecânica e as instalações para integração e testes de instrumentos.

PAINEL 167

APPLICATION OF THE HELIOMETRIC TECHNIQUE TO THE MEASURE OF THE SOLAR DIAMETER

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The heliometric method, in its original form, has been used to measure small angles at high precision. The basic principle consists of the duplication and displacement of the image in the focal plane in a way to allow the determination of the angular distance of nearby objects. There are several techniques to unfolding the images. In some systems the objective is cut in two equal parts that are displaced one from the other in order to produce a corresponding displacement of the images in the focal plane. In other equipments the unfolding is carried through in the focal plane by a set of prisms. The heliometric technique became well-known after the success in obtaining the measure of the first stellar parallax. One of the reasons for this good result resides in the fact that the method has been applied to the measure of the angular distance between point-like objects. In this type of measure it is possible to eliminate the errors of focalization through the displacement of the halves of the objective in directions

parallel to the cut. Another advantage of this technique is the fact that the images of the observed objects are projected close by in the focal plane and are formed by light beams that have followed practically the same optic path. The refraction effects are therefore minimized. The measurement of the solar diameter presents a significantly different challenge because it aims the measure of the diameter of an extensive object. The heliometric technique, in its original form, does not eliminate the focalization errors for this case. In this work we analyze proposals for the modification of the heliometric method in order to adapt it to measure the angular dimensions of an extended object and, in particular, to measure the solar diameter. The instrument is now in phase of construction. We also discuss the thermal and mechanical stability, the filter characteristics, as well as the image data processing.

PAINEL 168

AN OPTIMIZATION STRATEGY FOR THE DEFINITION OF THE BRAZILIAN DECIMETRIC ARRAY ANTENNA LOCATIONS

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Radio interferometric arrays measure the visibility function, which is the Fourier transform of the sky brightness distribution, in a finite set of points that are determined by the cross-correlation of the different pairs of antennas of the array. The sky brightness distribution can be reconstructed by the inverse Fourier transform of these sampled visibilities. The quality of the reconstructed images strongly depends on the array configuration, since it determines the sampling function in the Fourier plane. This work presents a new strategy to optimize the antenna locations of a radio interferometric array, which is based on the entropy of the distribution of the sampled points in the Fourier plane. A stochastic optimizer, the Ant Colony Optimization, employs the entropy of the distribution of the sampled points in the Fourier plane to iteratively refine the candidate solutions, since the entropy measures the uniformity of the sampling function. The proposed strategy was developed for the Brazilian Decimetric Array (BDA) that is currently being developed for solar observations at the National Institute for Space Research. Configurations results corresponding to the Fourier plane coverage, synthesized beam and side lobes levels are shown for an optimized BDA configuration obtained with the proposed strategy and, compared to the results for a standard array configuration that was originally proposed