

A STEP: AN ANTARCTICA SEARCH FOR TRANSITING EXTRASOLAR PLANETS. F. Fressin¹, T. Guillot¹, F. Bouchy², A. Erikson³, J. Gay¹, M. Gillon⁴, A. Léger⁵, C. Moutou², F. Pont⁶, H. Rauer³, and J.-P. Rivet¹, ¹Observatoire de la Côte d'Azur, CNRS UMR 6202, 06304 Nice, France (fressin@obs-nice.fr), ²Laboratoire d'Astrophysique de Marseille, BP 8, Les Trois Lucs, 13376 Marseille Cedex 12, France, ³DLR Institute of Planetary Research, Rutherfordstr. 2, 12489 Berlin, Germany, ⁴Institut d'Astrophysique et de Géophysique, Université de Liège, Allée du 6 Août, 17, Bat. B5C, Liège 1, Belgium, ⁵Institut d'Astrophysique Spatiale, UMR 8617, Université Paris XI, 91405 Orsay Cedex, France, ⁶Observatoire de Genève, 51 ch. des Maillettes, 1290 Sauverny, Switzerland.

We present ASTEP, a project dedicated to the search for planetary transits from Dome C, Antarctica. The site has crucial advantages for a ground-based exoplanet transit search: a 3-months long night during the antarctic winter with almost no clouds and no precipitation. Using theoretical simulations of the yield of transit surveys, we attempt to optimize the program to provide the largest number of detections for a given cost. However, the significance of systematic errors linked to variations of the temperature, the pointing, the seeing...etc., as well as unknowns such as the variations of the sky brightness, the noise due to moonlight and to auroras at Dome C currently prevents obtaining a robust, definitive answer to the question of the detection strategy.

Our project is a first step towards an ambitious transit search program at Dome C, possibly competing with a similar program from space, if the site is as excellent as it currently seems, based on summer qualification campaigns and preliminary winter measurements done by the LUAN (University of Nice-Sophia Antipolis) team.

We thus propose to simultaneously qualify the Dome C site for transit detection and obtain scientifically significant detections at a modest cost using a fully automatic 40 cm telescope. This system should be able to detect Jupiter-sized Pegasi planets transiting in front of stars as faint as magnitude sixteen and could also detect smaller planets in close orbits around brighter stars. Our estimations, based on results of previous surveys are an average of 6 detections per 60 days survey. Compared to existing surveys, this excellent yield is due to the nearly-continuous phase coverage.

A mid-term objective of 1000 detections for 2012 may be achieved either with many small telescopes or with a large Schmidt telescope with a large field of view.