Institute of Space Sciences

EXCELENCIA MARÍA DE MAEZTU

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Algorithms to detect protoclusters of galaxies in the Euclid survey

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Protoclusters of galaxies are non-virialized overdense structures in the distant universe which collapse into galaxy clusters with masses $\log(M/M_*) > 14$ by redshift 0. They are the precursors of present-day massive galaxy clusters. The evolution of galaxies in these overdense structures depart from the one observed in the field. On the other hand, the assembly and gravitational collapse of protoclusters are of great interest in constraining cosmological models. The Euclid survey will cover 15000 square degrees on the sky, the resulting data will make possible to detect a large number of protolcusters spanning a wide-range of masses up to redshift 4 and possibly higher. In this work, we present a new algorithm to detect protoclusters of galaxies which is based in a multi-scaling approach. The algorithm was developed within the Euclid Consortium (EC) and applied to the simulations carried out in the consortium with great success. Other algorithms which find protoclusters of galaxies have also been developed within the EC and we are now comparing their performances. Here, we give a glimpse of these algorithms and some preliminary results. The construction of a catalog of protoclusters is essential to execute some Key Projects approved in the EC.

Primary author(s) :   DÍAZ-SÁNCHEZ, Anastasio (Universidad Politécnica de Cartagena); Dr MANJÓN--GARCÍA, Alberto (Univesidad Politécnica de Cartagena); Mr VINAGRE-MAQUEDA, Aarón Rubén (Universidad Politécnica de Cartagena); Dr JÓDAR-FERRÁNDEZ, Esther (Universidad Politécnica de Cartagena)

Presenter(s) :   DÍAZ-SÁNCHEZ, Anastasio (Universidad Politécnica de Cartagena)

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