mixed with primary contributions leading to qualitative and/or quantitative imprecise detections.

A variety of methods are being used to search for different NG signals in CMB data because one does not expect that a single statistical tool can be able to identify all possible forms of Gaussian deviations. Using two directional large-angle NG indicators based on skewness and kurtosis statistical momenta of patches of the CMB sphere, we analyze the three nearly full sky foreground-cleaned *Planck* maps: SMICA, NILC, and SEVEM.

Our results show that these foreground-cleaned *Planck* maps exhibit different levels of NG at large angles, depending on the cut-sky mask used (all of them released by the *Planck collaboration*). The separation component minimum mask, termed M82, and the U73 mask appear to be equally efficient to Gaussianize all these CMB *Planck* maps.

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CENTRAL DOMINANT GALAXIES AND THE EVOLUTION OF THEIR HOST CLUSTERS

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We have studied a sample of 50 galaxy clusters, all with more than 100 spectroscopically confirmed member galaxies, from all Bautz-Morgan types, in order to determine the importance of the brightest cluster members (BCMs) and their relation to the structure and dynamical state of their host clusters. Strict tests for membership and for the presence of substructures were applied. Near-infrared data were used for photometry and astrometry, which allowed us to rank the member galaxies in order of their stellar mass content. The large spectroscopic sampling, the broad range of morphologies, masses and intra-cluster medium properties, beyond the improved analyses for membership and substructuring, make this sample an especially suitable reference of nearby optical clusters ($0.005 < z < 0.150$) for the study of cluster evolution and environment effects on member galaxies. Only 35% of the clusters revealed to be unimodal, 50% to be substructured and other 15% to be multi-modal. Also, for about 20% of the sample, the Central Dominant Galaxy (CDG) of the main structure is not the first-ranked BCM, but the CDG of a substructure. More massive clusters present more than one dominant galaxy, while the less massive ones present only one, if any. This correlation goes in the sense that most of the evolution of CDGs occurs in groups that are doomed to merge and form clusters.

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NEW CATALOGUES OF SUPERCLUSTERS OF ABELL/ACO GALAXY CLUSTERS UP TO $z \sim 0.15$

M. Chow Martínez[1], H. Andernach[1], and C. A. Caretta[1]

We present two new catalogues of superclusters of galaxies within a redshift of $z = 0.15$, constructed using the Abell/ACO cluster redshift compilation by one of us (H.A.). One is the all-sky Main SuperCluster Catalogue (MSCC), based on 3410 A-clusters (92% with spectroscopic redshifts), containing 601 superclusters with multiplicities from 2 to 42; the other is the Southern ($\delta < -17°$) SuperCluster Catalogue (SSCC) based on 1227 A-clusters and 1177 S-clusters (90% with spectroscopic redshifts), containing 425 superclusters with multiplicities from 2 to 39. These are currently the deepest all-sky supercluster catalogues based on optical data. By comparing both catalogues, we found the following effects (expressed as percentages of the total number of superclusters in SSCC): new superclusters with S-clusters around A-cluster cores (12.6%), the formation of bridges of S-clusters between A-clusters (1.2%), and the addition of new superclusters formed by S-clusters only (25.4%). We determined morphological parameters for the superclusters, based on ellipsoid fits and Minkowski functionals, obtaining that 39% of the rich (multiplicity >5) superclusters are prolate ellipsoids and 61% are oblate ones. The cumulative multiplicity functions of both catalogues follow very closely a power law with an exponent of −2.0 for MSCC and −1.9 for SSCC. This power law is clearly inconsistent with the same function we derived for supercluster catalogues based on simulated samples of randomly distributed clusters. It is also inconsistent, though less significantly, with similar analyses we applied to the Bolshoi cosmological sim-

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ulation of the evolution of the large-scale structure of the universe.

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HUGE-LQG- THE LARGEST STRUCTURE IN THE UNIVERSE

R. G. Clowes[1], S. Raghunathan[2], K. A. Harris[3], L. E. Campusano[2], I. K. Sochting[4], and M. J. Graham[5]

A large quasar group (LQG) of particularly large size and high membership has been identified in the DR7QSO catalogue of the Sloan Digital Sky Survey. It has characteristic size ($volume^{1/3}$) $\sim$ 500 Mpc (proper size, present epoch), longest dimension $\sim$ 1240 Mpc, membership of 73 quasars and mean redshift z=1.27. In terms of both size and membership, it is the most extreme LQG found in the DR7QSO catalog for the redshift range $1.0 < z < 1.8$ of our current investigation. Its location on the sky is $\sim$ 8.8 degrees north ($\sim$ 615 Mpc projected) of the Clowes & Campusano LQG at the same redshift, $z = 1.28$, which is itself one of the more extreme examples. This new, Huge-LQG appears to be the largest structure currently known in the early Universe. Its size suggests incompatibility with the Yadav et al. (2010) scale of homogeneity for the concordance cosmology, and thus challenges the assumption of the cosmological principle.

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SUPER-MASSIVE BLACK HOLE GROWTH IN THE FIRST GIGAYEAR OF COSMIC HISTORY

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As two galaxies collide the super-massive black holes in their centers will merge. The resulting black hole will be ejected with a certain kick velocity. The black hole will move in the galaxy's potential well while it oscillates and returns to its initial position due to dynamic friction processes. In this work we use semi-analytic techniques to follow the amount of mass accreted by the BH since the initial kick until its return to a stationary position at the center of the host galaxy. We focus our study on black holes in the mass range $10^6 - 10^9$ Msun. We use these results to re-interpret the observational constraints on the growth of super-massive black holes during the first gigayear of cosmic history.

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CONTRASTING DISTANCES USING TYPE IA SUPERNOVAE AND GAMMA RAY EVENTS IN THE LOCAL UNIVERSE

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In the year 1998, it is discovered -through Type Ia supernova observation- that the universe is expanding at an accelerating rate. One interpretation, which is not contrary to General Relativity, accepts the existence of a cosmological constant other than zero and of Quintessence, a repulsive force. These supernovae are used as standard candles to measure both distances and the accelerating expansion rate of the universe. Although this is based on well-known and proven facts, it was found that the method employed contains systematic errors. The purpose of this study is to present an alternative method to reduce the errors through the measurement of galactic distances, using gamma-ray events from gamma-ray binaries and microquasars. As the actual supernova population is rather small to be statistically reliable, it is supported with numerical simulations to provide a contrast between Type Ia supernovae and gamma-ray events. To this end, we apply the measurement of Type Ia supernovae to nearby galaxies where is possible to measure the accelerating expansion of the universe. Afterwards, assuming that the observations and instrumentations would enable this possibility, we perform the measurements of a group of microquasars, taking on account their approximate equitable distribution of energy which is contrary to the results of supernovae. Our study remains open to further exploration on whether there is a difference between the distances measured or they are compatible and they manage to minimize the systematic

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