Standard External Collaborator Application

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Project: XMM clusters in the DECam-SV region

Contact person: Kathy Romer <romer@sussex.ac.uk>

Participants:

DES: (*anyone else in DES is welcome to get involved*) David Bacon[⌘], Wayne Barkhouse, Leon Baruah[§], Christophe Benoist, Alberto Bermeo[§⌘], David Burke, Diego Capozzi[⌘], Luiz da Costa, Shantanu Desai, David Gerdes, Meghan Gray, Christina Hennig[§], Ben Hoyle[⌘], Tesla Jeltema, John Katsaros, Andrew Liddle[⌘], Marcio Maia, Claudia Maraston, Paul Martini, Julian Mayers[§⌘], Nicola Mehrtens[⌘], Chris Miller[⌘], Joe Mohr, Bob Nichol[⌘], Lyndsay Old[§], Ricardo Orgando, Kathy Romer[⌘], Phil Rooney[§⌘], Eduardo Rozo, Eli Rykoff, Jeeseon Song, Marcelle Soares-Santos, Daniel Thomas, Harry Wilcox[§⌘], Yuan-Yuan Zhang[§], ([§]student; [⌘]XCS member).

EXT: (*members of XCS*) Chris Collins, Matt Hilton, Scott Kay, Bob Mann, Martin Sahlen, John Stott, Pedro Viana.

Working Group: Cluster Working Group

Wiki link: https://cdcvs.fnal.gov/redmine/projects/des-clusters/wiki/XMMarchiveWork

Duration: 1 year

Deliverable(s):

1) A sample of X-ray clusters, and X-ray cluster candidates, detected by XMM (either as targets or serendipitously) that fall in the DECam-SV footprint. This sample can be used for: acceptance testing; development of cluster finder algorithms; weak lensing algorithm tests; and DES publicity/outreach. A draft version (with more than 350 entries) has already been circulated to the CWG (this can be found using the wiki link above).

2) A journal article. This will be a catalogue of X-ray clusters with DECam-SV counterparts. Many of these clusters will already be known to the literature (although not necessarily as *X-ray* clusters), but we estimate that ~1/3 will be new (new discoveries of medium to high redshift X-ray clusters are of sufficient interest to the cluster community to merit publication). X-ray co-ordinates, luminosities and temperatures, together with redshift information, will be made available via e-tables. We also anticipate making DECam false colour “postage stamps” images available via an accompanying webpage, similar to that used for XCS-DR1 (http://www.xcs-home.org). The XMM-SV cluster catalogue will be used for a wide range of science analyses. Such analyses are not covered by this EC application, although may be the subject of future applications.

DES inputs: DECam-SV imaging data; DESDM reductions; ``Munich'' reductions; photometric (red-sequence) redshifts.

XMM Cluster Survey inputs:

The XMM Cluster Survey (XCS; PI Kathy Romer) is a small (13 Full Members, 11 Associate Members), international, collaboration that exploits serendipitous detections of clusters in the XMM archive, e.g. see http://arxiv.org/abs/1106.3056.

There is no formal MOU between XCS and DES, but the XCS collaboration has agreed that three proprietary XCS pipelines can be used by Romer's students to support DES: i) a pipeline to generate reduced XMM images from raw archival data; ii) a pipeline to detect sources in those XMM images, and to pick out cluster candidates; iii) a pipeline to measure L_x and T_x values for confirmed clusters. Collectively, these pipelines have taken more than 5 full time person years to develop. We request that certain Full Members of XCS be included on the author list. This co-authorship would recognize their historical contributions to XCS pipeline development.

Potential for future, related, EC applications:

1. Science Exploitation: Several XCS members have specialist expertise that could be applied to DECam-SV observations of XMM clusters, e.g. in the areas of: i) brightest cluster galaxies (e.g. 1005.4681); ii) intracluster light (e.g. 1206.4735), iii) Halo Occupation Distributions (e.g. 1109.5735), and iv) AGN activity in clusters (e.g. 1005.4692, 1202.3787). Diego Capozzi (who leads the Cluster-Galaxy-Evolution Sub-group) will determine if any additional XCS EC applications would be beneficial to DES.

2. Extended XMM cluster catalogues: The current application only covers the overlap between the XMM archive and the DECam-SV region. Romer is committed to providing similar XMM data products across the whole DES footprint. The mechanism for publishing these future XMM-DES cluster catalogues has not yet been decided, but might well prompt an additional XCS EC application.

Relation to other DES cluster projects:

A fraction of the XMM-SV clusters were also detected by SPT (indeed some are only in the XMM archive because they were detected by SPT). Some have also been observed by Chandra. There are sufficient members in common (between the XCS, SPT and Chandra projects) to ensure that resulting papers are complementary.