PREDISCOVERY ARCHIVE DETECTIONS OF LONG PERIOD COMETS IN PREPARATION FOR THE ESA COMET INTERCEPTOR MISSION. P. Lacerda[1,2], N. Attree[3], S. Bagnulo[4], I. Bertini[5], A. Beth[6], C. Goetz[7], J. C. Gómez Martín[8], A. Guilbert-Lepoutre[9], H. Gunell[10], S. Ivanovski[11], G. H. Jones[12], E. Kallio[13], R. Kokotanekova[14], M. Küppers[15], M. Lazzarin[16], S. Lowry[17], R. Marschall[18], F. Moreno[8], B. Novakovic[8], K. Otto[19], N. Peixinho[2], A. Penttilä[20], G. Rinaldi[21], K. Shirley[22], C. Snodgrass[23], C. Tubiana[21], J.-B. Vincent[19], and V. Zakharov[24].
[1]Instituto Pedro Nunes, PT (placerda@ipn.pt), [2]Instituto de Astrofísica e Ciências do Espaço, Universidade de Coimbra, PT, [3]Technische Universität Braunschweig, DE, [4]Armagh Observatory & Planetarium, UK, [5]Department of Science & Technology, University of Naples 'Parthenope', IT, [6]Imperial College London, UK, [7]Northumbria University, UK, [8]Instituto de Astrofísica de Andalucía, CSIC, ES, [9]CNRS - Laboratoire de Géologie de Lyon, FR, [10]Umeå University, SE, [11]INAF - Astronomical Observatory of Trieste, IT, [12]UCL Mullard Space Science Laboratory & The Centre for Planetary Science at UCL/Birkbeck, UK, [13]Aalto Univ., FI, [14]Institute of Astronomy and National Astronomical Observatory, BG, [15]European Space Agency, ESAC, Villanueva de la Cañada, Madrid, ES, [16]Univ. of Padova, IT, [17]Univ. of Kent, UK, [18]CNRS, Observatoire de la Côte d'Azur, FR, [19]DLR Institute of Planetary Research, DE, [20]Univ. of Helsinki, FI, [21]INAF - IAPS, IT, [22]Univ. of Oxford, UK, [23]University of Edinburgh, UK, [24]LESIA, Observatoire de Paris, France.

Introduction: Comet Interceptor (CI) is a mission led by the European Space Agency (ESA), with significant contributions from the Japanese Space Agency (JAXA) [1, 2]. It aims to study a long-period comet (or an interstellar object) entering the inner Solar System for the first time. The mission will flyby the target and study it from different vantage points using a three-component spacecraft and a range of scientific instruments.

Why now?: Such a mission has been previously impossible because the time required to prepare and launch a rendezvous mission is much longer than the time to reach the target following its discovery. Two novel aspects enable the CI mission. Firstly, the time to encounter will be shortened by developing, launching and stationing the spacecraft at Earth's L2 Lagrangian point, possibly even before the discovery of a target. Secondly, the Vera Rubin Observatory Legacy Survey of Space and Time (LSST) will increase the ability to detect a target early. LSST will likely identify a target very close to, or even before, the CI launch in 2029.

Preparation: A Science Working Team, supported by science Working Groups focussed on Target Identification [3] and the Comet Environment [4], will contribute to mission preparation by developing scientific models that address several aspects of the mission to help it maximise scientific return.

Learning from the past: In the context of target identification, we will study LSST's ability to detect a suitable target by looking at archive data. We will search for pre-discovery images of long-period comets that have visited us in the past and investigate how those distant detections can predict the comet's properties and its behaviour at rendezvous distances. We present our first results at this meeting.

Acknowledgments: Contributions are supported by the national space agencies of the European Space Agency Member States.

References: [1] www.cometinterceptor.space [2] Küppers M., et al., this meeting. [3] Snodgrass C., et al., this meeting. [4] Jones G. H., et al., this meeting.