Two open positions at Light Bridges

Light Bridges invites applications for two full-time positions:

1 — Computational Scientist · GPU Optimisation & Performance (LB-CORVUS-01)
2 — Research Scientist · Algorithm Design & Image Processing (LB-CORVUS-02)

Positions available	2
Location	Remote — HQ in Tenerife, Canary Islands, Spain
Project	CORVUS
Publication date	18 August 2026
Application deadline	27 September 2026
Expected starting date	November 2026

About Light Bridges

Light Bridges is a private company based in the Canary Islands dedicated to the operation of scientific infrastructures and to carrying out research projects, mainly in **astronomy, ground-to-space optical communication and high-performance computing**. We operate the Two-meter Twin Telescope (TTT) and the Transient Survey Telescope (TST) at the Teide Observatory, together **one of the largest fully robotic telescope facilities in the world**, alongside ASTROPOC, a high-capacity centre for massive data management and processing, with CPU/GPU compute and high-performance storage located next to the telescopes themselves.

The project

Both positions open within **CORVUS**, whose objective is the creation of an end-to-end platform for the detection and characterisation of fast-moving, very faint objects, particularly **near-Earth objects and space debris**. This engine is built around **GPU-accelerated synthetic tracking**, a technique that recovers objects too faint and too fast to appear in any single exposure.

(See What is synthetic tracking for the technical background and references.)

CORVUS represents a major investment in new technology aimed at advancing global **Planetary Defence** capabilities. It is coordinated by Light Bridges (P.I. Miguel R. Alarcon) in partnership with the Instituto de Astrofísica de Canarias (IAC) and the Universidad de Oviedo (UniOvi). It was awarded under the 2025 Public-Private Collaboration call of the Spanish Research Agency (AEI) and funded by MICIU/AEI/10.13039/501100011033 (project CPP2025-012040).

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The two positions

Both roles are broad and overlapping. In practice we expect one hire to lean towards **low-level performance and GPU optimisation** and the other towards **algorithm design and image processing**. We are flexible about how the split works out in practice. You would work as part of a group of 6 to 10 astronomers, software engineers and researchers across the three partners.

Advanced software development and scientific research are equal priorities for us. During the project you will work with world-class professional telescopes, take part in observing proposals and be in direct contact with international research groups. We expect the people we hire to co-author scientific publications and to take part in the scientific output of the project, including the discovery of new Solar System objects.

Work is centred on CORVUS, but not limited to it. Light Bridges currently runs a range of research projects, most of them astronomy-related, and both positions may involve joining or contributing to other research lines and tasks within our Science and Operations teams.

Requirements

- **PhD** in any quantitative discipline (computer science, physics, mathematics, engineering, astrophysics, etc.) obtained **before the end of 2026**.
- Hands-on experience with **GPU-accelerated computing**.
- Strong Python.
- Professional-level English (working language of the consortium and our international collaborations).

We are deliberately looking for broad profiles from any field where large-scale computation and image processing matter. We expect candidates to be comfortable **working autonomously**, with regular but not day-to-day supervision.

Nice to have

No one will tick every box below and we do not expect it. Tell us which ones you bring**.**

- GPU programming at any level: CUDA or OpenCL kernels, CuPy, Numba, PyTorch, TensorFlow.
- Familiarity with containerised environments: Docker.
- Performance analysis and optimisation: profiling, memory-hierarchy and I/O tuning, roofline reasoning, benchmarking methodology.
- Experience delivering end-to-end projects: database design and management, and reliable handling of massive data volumes.
- Experience moving research code into production.
- Applied optimisation: global maximum search, hierarchical algorithms, MCMC, Bayesian inference, or other alternatives to exhaustive search.

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- Signal or image processing: deconvolution, matched filtering, source detection.
- Machine learning applied to classification and ranking of noisy candidate detections.
- Distributed or streaming computation; Git-based workflows and CI.
- Experience in observational astronomy or astronomical image processing.
- Research experience in Solar System science or Space Situational Awareness (SSA).
- Spanish (useful day to day, not required).

Contract information

- Indefinite contract, with dedicated project funding secured through February 2029.
- Fully remote, with no geographical restriction. Our facilities are in Tenerife (Canary Islands, Spain). Occasional travel for consortium meetings or conferences may be arranged, but regular on-site presence is not required.
- Full time, with flexible working arrangements.
- approx. €39,700 gross per year (€48,700 total employer cost).

How to apply

Send a **CV** and a **short letter** (max. 2 pages) to **jobs@lightbridges.es**, stating what you could bring to the project and how your profile fits it. Questions about the positions or the application process are welcome at the same address. Links to code, repositories, benchmarks or papers you are proud of are more useful to us than long lists of courses.

Light Bridges is committed to equal opportunity. We actively encourage applications from women and from candidates from under-represented groups in high-performance computing and space science.

We expect to review applications until 27 September 2026, but a decision may be made earlier, so we **encourage you to apply as soon as possible**.

What is synthetic tracking?

The standard way to find an asteroid is to take three or four long exposure images separated by some minutes and look for a source that has changed its position between them along a consistent trajectory. This breaks down for fast-moving objects (space debris and near-Earth objects, many of them potentially hazardous) because during a long exposure the object drifts across several pixels. Its signal is spread into a faint streak instead of concentrated in a point source and it is normally buried in the background noise and simply never detected (Fig 1.a).

CORVUS is built around **GPU-accelerated synthetic tracking**. Instead of a few long exposures we take many short ones and co-add them along thousands of hypothetical trajectories (Fig 1.c): for each candidate motion, the frames are shifted coherently and stacked, so that an object moving that way adds up constructively and emerges from the noise as a point source (Fig 1.b).

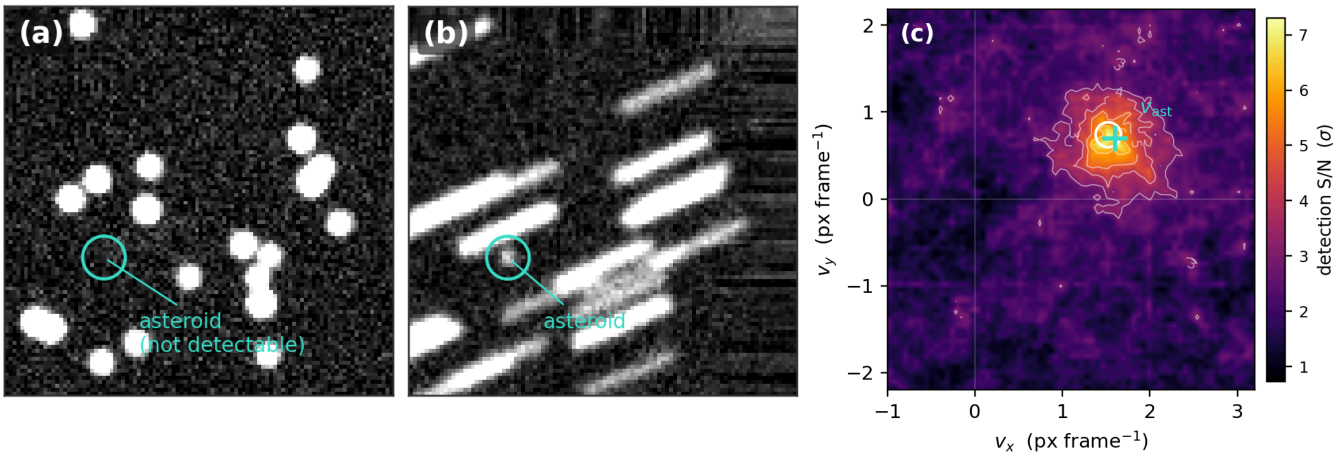

Fig 1. Principle of synthetic tracking (shift-and-add), illustrated on a simulated field of 15 consecutive 4 s exposures (60 s total). The moving target has a per-frame signal-to-noise (S/N) ratio below unity and is therefore undetectable in any individual frame. **(a)** Co-adding the frames aligned on the stars (long exposure) produces sharp stellar images, but the asteroid smears along its apparent path; its flux, spread over many pixels, remains buried in the noise and undetectable. **(b)** Co-adding the same frames while shifting each one by the target's apparent motion makes the asteroid's flux add coherently into a single point source (peak S/N ≈ 7), while the now-misaligned stars are drawn into trails. **(c)** Detection statistic as a function of the trial velocity (v_x, v_y). The surface reaches a clear maximum at the target's true velocity (cyan cross; recovered maximum marked by the white circle), from which the object's rate and direction of motion are recovered. The signal-to-noise gain of the coherent stack scales as √N with the number of co-added frames.

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Some public and private codes implement this idea, but large-scale deployment remains very limited. CORVUS is an attempt to build a complete end-to-end solution around it, from ingestion of high-cadence sequences to validated, reportable measurements.

These are the questions on our table right now:

- **Running synthetic tracking close to real time.** A single night produces thousands of images (TBs of data) and each one has to be searched across a large space of apparent-motion hypotheses. Doing this fast enough to be operationally useful is the central challenge of the project.
- **Searching that space intelligently.** The current implementation is exhaustive. We want to look for better solutions: hierarchical and coarse-to-fine strategies, smarter maximum-finding, Bayesian formulations. This is genuinely open ground.
- **Handling a point-source shape (PSF) that varies across the field and along the sequence**, correctly, inside that search.
- **Convolution and matched-filtering strategies that stay efficient at scale**, where the naive approach is orders of magnitude too slow.
- **Image differencing that leaves as little residual as possible**, particularly in crowded stellar fields where imperfect subtraction generates far more spurious candidates than real detections.
- **Going from stacked signal to a decision.** Extracting candidates is one problem; filtering them so that a human operator sees a short, trustworthy list instead of thousands of spurious detections is another, and arguably the harder one.

None of these has an off-the-shelf answer. We are looking for new algorithms as much as for faster code, which is why we value creative problem-solvers with strong technical foundations.

Some references:

- Shao, M., et al. 2014, "*Finding Very Small Near-Earth Asteroids using Synthetic Tracking*", ApJ 782, 1 — doi.org/10.1088/0004-637X/782/1/1
- **Whidden**, P. J., et al. 2019, "*Fast Algorithms for Slow Moving Asteroids: Constraints on the Distribution of Kuiper Belt Objects*", AJ 157, 119 — doi.org/10.3847/1538-3881/aafd2d
- **Smotherman**, H., et al. 2021, "*Sifting through the Static: Moving Object Detection in Difference Images*", AJ 162, 245 — doi.org/10.3847/1538-3881/ac22ff
- Zhai, C. et al. 2014, "*Detection of a Faint Fast-moving Near-Earth Asteroid Using the Synthetic Tracking Technique*", ApJ 792, 60 — doi.org/10.1088/0004-637X/792/1/60
- Zhai, C., et al. 2024, "*Near-Earth Object Observations using Synthetic Tracking*", PASP 136, 034401 — doi.org/10.1088/1538-3873/ad23fc

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