Compliance sheet — star-sphere

Everything a supplier qualification, a legal review or an export check usually asks about star-sphere 0.1.1, in one document.

1. Identity

Document	STAR-PKG-STAR-SPHERE-EN · v2.3 · 2026-11-14
Package	star-sphere
Version	0.1.1
Capability	star.geometry.sphere
Maturity	Released & Verified (RELEASED)
Python	>=3.9
Source commit	dc09f61d
Source	https://github.com/Andrea07072000/S.T.A.R.-/tree/main/packages/star_sphere

2. Licence and obligations

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3. What it needs at run time

Nothing beyond the Python standard library: it works offline.

4. Integrity

SHA-256 fingerprints of the files published on this website. Check a downloaded file with:

```
python -c "import
hashlib,sys;print(hashlib.sha256(open(sys.argv[1],'rb').read()).hexdigest())" star_sphere-
0.1.1-py3-none-any.whl
```

FILE	SHA-256
star_sphere-0.1.1-py3-none-any.whl	a51886a9b856625c7de68bd9dcf37be51ba5711fb147545f053ddae01fe7dbe3
star_sphere.py	109d55b2ce7627f10b231c80276369061a59e12450ebbbef7507183668b9beb1
star_sphere-0.1.1-source.zip	49953da198329b30d4a4debda5fd5257ea78ce0239d512326c3dc704d950d54e

5. What it does, and its limits

Angular separation, position angle and offset point for directions on the sphere, accurate from 1e-12 deg to the antipode; agrees with ERFA and astropy to 3e-14 deg on 600 pairs and refuses out-of-range angles.

A sphere: for distances on the Earth's ellipsoid use `star_geodesic` (the difference reaches 0.5 %). No proper motion, aberration or refraction: the directions are taken as given.

- `separation_deg` in [0, 180] with the arc-tangent formula: nearby directions (1e-12 deg) and nearly antipodal ones keep their digits. Reproduces Meeus Example 17.a (32.7930 deg). Since 0.1.1 the differences of longitude and latitude are taken in degrees before any conversion, so a separation of 1e-12 deg is right to the last digits (0.1.0 was wrong in the sixth digit at 1e-9 deg and in the third at 1e-12 deg: update if you measure tiny angles).
- `position_angle_deg` in [0, 360), from North through East; `offset(lon, lat, position_angle, distance)` returns (longitude in [0, 360), latitude) and is the inverse of the two.
- Measured on 600 pairs (300 random, 150 down to 1e-6 deg apart, 150 down to 1e-6 deg from the antipode): separation within 6e-14 deg of ERFA and astropy, position angle within 1e-15 rad of displacement, offset points within 4e-13 deg of astropy.
- Every function returns finite floats in those ranges or raises `ValueError`: non-numeric, boolean, NaN or infinite input, latitude outside [-90, 90], longitude or position angle outside [-360, 360], distance outside [0, 180]. For coincident directions the position angle is undefined and returned as 0.

6. Export, use and certification

The package is published and freely available. That usually takes software out of export-control lists, but not every use of it: read the page on space activities and export control before using it in a controlled programme. It is not certified or qualified for flight; the evidence describes what was tested and how.

7. Citation and bill of materials

```
@software{cavazzini_star_sphere_0_1_1,
  author  = {Cavazzini, Andrea},
  title   = {{star-sphere}: Angles between directions on the sphere},
  version = {0.1.1},
  year    = {2026},
  url     = {https://andrea07072000.github.io/S.T.A.R.-/software/star_sphere/},
  note    = {Apache-2.0. Source: https://github.com/Andrea07072000/S.T.A.R.-, commit dc09f61d}
}
```

CITATION.cff · BibTeX · SBOM CycloneDX 1.5 · SBOM SPDX 2.3

8. Warranty and liability

Provided "as is", without warranties or conditions of any kind (Apache License 2.0, sections 7 and 8), to the extent the law allows. This never excludes liability that the law does not allow to exclude.

Related: space activities and export control · acceptable use · evidence and limits · licence texts