Compliance sheet — star-iod

Everything a supplier qualification, a legal review or an export check usually asks about star-iod 0.1.0, in one document.

1. Identity

Document	STAR-PKG-STAR-IOD-EN · v2.3 · 2026-11-14
Package	star-iod
Version	0.1.0
Capability	star.orbit.iod-gibbs
Maturity	Released & Verified (RELEASED)
Python	>=3.9
Source commit	dc09f61d
Source	https://github.com/Andrea07072000/S.T.A.R.-/tree/main/packages/star_iod

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_iod-0.1.0-
py3-none-any.whl
```

FILE	SHA-256
star_iod-0.1.0-py3-none-any.whl	39322ea6ad2433c0258767350766a344beb627113c38f5e104072b4137e2acca
star_iod.py	6a2072071e695d5209723ff1f667502faff9e7f3c5683732a9765f1e4878d01e
star_iod-0.1.0-source.zip	047b01c71b430e5eb6dab23fef8f8f7c2af8a9d01701c18034cae301c685cd6f

5. What it does, and its limits

Velocity at the middle of three position vectors by Gibbs' method (cancellation-free form) and Herrick-Gibbs, with the measured domain of each (crossover near 0.4 degrees), agreement with Orekit IodGibbs within 8e-9 and explicit refusal of non-coplanar, collinear or impossible geometry.

Perfect positions in, velocity out: no measurement noise model, no covariance, no angles-only methods (Gauss, Laplace, Gooding), no differential correction. With noisy fixes the error of either method is dominated by the noise divided by the arc length, not by the figures above.

- `gibbs(r1, r2, r3, mu, coplanar_tol_deg=3)`: Vallado Algorithm 54. Reproduces Example 7-3 within 5e-7 km/s. The direction of motion is the order r1, r2, r3. The sums of the textbook form are written with differences of neighbouring vectors: at 0.02 degrees of spacing the error is 2e-8 relative instead of 1.5e-5.
- `herrick_gibbs(r1, r2, r3, t1, t2, t3, mu, coplanar_tol_deg=3)`: Vallado Algorithm 55, for closely spaced positions; `separation_deg` returns the two angles.
- Measured domains (240 known orbits, largest relative velocity error by spacing in mean anomaly):
- Every function returns three finite floats or raises `ValueError`: wrong shapes, non-numeric, boolean, NaN or infinite input; a zero position; mu <= 0; positions further than `coplanar_tol_deg` from a common plane; collinear or coincident positions; positions through which no orbit about the centre passes (Gibbs); times not strictly increasing (Herrick-Gibbs).

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_iod_0_1_0,
  author  = {Cavazzini, Andrea},
  title   = {{star-iod}: Velocity from three positions (Gibbs, Herrick-Gibbs)},
  version = {0.1.0},
  year    = {2026},
  url     = {https://andrea07072000.github.io/S.T.A.R.-/software/star_iod/},
  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

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