PRODUCT OVERVIEW

CygnusWave Observatory Tools

Two browser-based calculators that turn tape-measure numbers into the settings and clearances an observatory actually needs — a dome geometry tool that produces NINA dome-sync values, and a roll-off-roof planner that shows exactly which parts of the sky your building blocks. No install, no account, no data leaves the browser.

Runs entirely in the browser · No install · Open source — MPL 2.0 · Imperial & metric · Save / load setups · Light & dark

Why these exist

Observatory geometry is unforgiving. A pier a few inches off centre, a mount whose declination axis sits above the dome springline, or a wall two courses too high, and you lose sky you paid for — usually discovering it after the concrete has cured. Both tools let you settle that on screen first, with the numbers and the picture driven from the same maths.

SCREENSHOT 1 — HERO

Both calculators side by side, 3D preview visible, dark theme.

Open each tool at default settings. Capture the full window at 1600×1000. Dome: leave RA 0 / Dec 90 so the mount sits parked. ROR: same.

Dome & Mount Geometry Calculator

Produces the four values NINA needs under *Options → Dome*, from measurements you can take with a tape and a plumb bob. The dome-sync maths is ported directly from NINA's own `DomeSynchronization.cs`, so the numbers match what the software will do.

Measure, don't guess

Measure from each wall to the point below your mount's pivot — north, south, east, west. The signed offsets are derived for you and shown live. If you already have your NINA values, switch to direct entry instead.

Shutter clearance, not just azimuth

Projects your actual aperture onto the dome surface as a ghost circle, so you can see whether the light path clears the shutter opening — not merely whether the dome is pointed roughly the right way.

Full-sky coverage sweep

Sweeps the whole sky and plots what the shutter can and cannot reach, on both sides of the meridian for an equatorial. Alt/Az collapses to a single plot, since there is no flip.

Dual saddle and guide scopes

Side-by-side OTAs with a lateral axis offset, and a guide-scope correction that shifts the tracked optical axis. Clearance is checked for each tube independently.

SCREENSHOT 2 — DOME, MEASUREMENT WORKFLOW

Step 1 open, showing the four wall measurements and the derived orange N/S and E/W readout.

Dome tool → Mount Position card. Set North 30, South 48, East 39, West 39 so the derived offset reads a non-zero value. Capture the left column.

SCREENSHOT 3 — DOME, 3D PREVIEW WITH GHOST APERTURE

3D dome with the mount, the pointing ray and the ghosted aperture circle on the dome surface.

Dome tool → set RA 20, Dec 60. Orbit so the shutter and the ghost circle are both visible. Capture the 3D panel only.

SCREENSHOT 4 — DOME, SKY COVERAGE

The full-width Sky Coverage row, both pier-east and pier-west plots.

Dome tool → expand Sky Coverage with mount type Equatorial. Capture the full row.

Roll-Off-Roof Observatory Planner

Answers the question a roll-off roof actually poses: with these walls, this roof and the mount here, how much sky do I lose? Every wall, the roof in its parked position and your local terrain horizon are combined into one obstruction model.

Three roof shapes

Flat, peaked and wedge. The peaked roof takes a pitch ratio rather than a ridge height — enter 1:6 and the ridge is computed from the building span, then shown back to you.

Buildings that aren't rectangles

Up to six walls at arbitrary angles and distances, so an L-shaped or clipped-corner building can be modelled properly instead of approximated by a box.

Swing clearance that knows the mount

An equatorial sweeps a counterweight; an alt/az does not. Each is measured on its own terms, so a fork mount is not told it needs an equatorial's swept volume.

Exportable horizon

Walls, roof and terrain combine into a horizon profile you can export as a `.hrz` file for your planning software.

SCREENSHOT 5 — ROR, BLOCKED POINTING

3D view with the pointing ray red where the wall blocks it, status line showing the reason.

ROR tool → set Dec to about 20 and RA to −60 until the status reads blocked. Capture the 3D panel plus the status line above it.

SCREENSHOT 6 — ROR, ROOF SHAPES

Three captures of the same building with flat, peaked and wedge roofs.

ROR tool → Building & Roof card. Capture the 3D panel once per roof shape at the same camera angle, then place them in a row.

Two mount models, both to scale

Switching mount type changes the model and the maths together, not just a label.

	EQUATORIAL (GEM)	ALT/AZ OR FORK
3D model	Latitude-tilted RA axis, RA and Dec rotors, counterweight shaft	PlaneWave L-500 direct drive — base drum, offset arm, altitude drive drum
Meridian flip	Pier side inverts the mount, aim unchanged	Not applicable — control hidden
Swing radius, 600 mm OTA	979 mm	651 mm
Swing radius, 2000 mm OTA	2379 mm	1220 mm
Sky coverage	Both sides of the meridian	Single plot

SCREENSHOT 7 — MOUNT COMPARISON

The same tool, same pointing, captured once as Equatorial and once as Alt/Az.

Either tool → set RA 30, Dec 60. Capture the 3D panel. Switch mount type to Alt/Az and capture again without moving the camera. Place side by side.

Built to be checked

The 3D view is not a decoration drawn alongside the numbers — it is driven from the same calculation. Across 36 pointing combinations per tool, spanning latitudes +60° to −33°, the rendered telescope matches each tool's own computed sky position to **0.0000°** in both altitude and azimuth. If the picture and the numbers ever disagreed, that would be a bug, and it is tested as one.

> Pointing is validated against textbook hour-angle to altitude/azimuth conversion, not against itself. The mount geometry rebuilds whenever a structural dimension changes, so the pier always meets the floor and the swept volume always reflects the current optics.

Everything else

- **Imperial and metric** throughout, with fractional inches to 1/16″ shown beside every field
- **Local horizon** — per-azimuth terrain profile layered on top of the building geometry

- **Save and load** complete setups as JSON; reset to defaults at any time
- **Light and dark themes**
- **Three-column layout** — inputs left, live controls centre, 3D right
- **Nothing leaves your browser** — no accounts, no telemetry, no server

Licence

Both tools are open source under the Mozilla Public License 2.0. The source is the HTML file itself — view source and read it.

About the project

CygnusWave builds observatory planning tools for amateur astronomers. The story behind the project, the people who helped shape it and how to get in touch are on the about page:

`cygnuswave.io/about.html →`