

masked_data_RG_80nM, signature 4f9dfa16

Recording

Rat heart, ventricular fibrillation. 128 × 80 px, 3,800 frames, 1 kHz, 112.5 µm/px, deposit checks: unit range, non integer, nan mask partial, temporal smoothing, spatial smoothing. Source 10.5281/zenodo.18319102; publication 10.1093/cvr/cvaa141; licence CC-BY-4.0; Verstraeten, Bjorn; Lootens, Sebastiaan. sha256 9e30977de373f78d1b5d236bd100e46bb79c72152d3a7516b9c03c4849391076.

Run

e41d035d-080a-4db2-a665-c4738243cdc3, 2026-10-27 23:43 UTC to 2026-10-27 23:46 UTC, status done. Protocol Rat whole heart optical mapping (Zenodo 18319102), parameters v1 set by developer (not a domain scientist). Code 905d5bebbb29da7ad46cd5045db14330695037c3 (uncommitted changes), None workers.

Methods

Recording Rat heart, ventricular fibrillation (RG 80 nM) (doi:10.5281/zenodo.18319102; 128x80 px, 3800 frames, 1000 Hz) was analysed over frames 200-3600. Deposit shows signs of prior processing (provisional): unit range, non integer, nan mask partial, temporal smoothing, spatial smoothing. Each pixel was baseline-corrected by subtracting a 121-frame centered moving average; NaN pixels were set to zero. Dye polarity (upright) was taken from the sign of the median per-pixel skew of dV/dt. For phase only, each frame was spatially filtered with a Gaussian (sigma 1.0 px, truncated at 4.0 sigma); no temporal low-pass was applied. Phase was the angle of the Hilbert transform with 200 frames of padding on each side. Phase singularities were plaquettes with |winding| > 0.9 turns at least 3 px inside the tissue edge; they were tracked across frames (same charge, <= 4.0 px per frame, gaps <= 5 frames), and a persistent rotor was a track lasting >= 25 frames (1 cycle(s) of the fastest segment) within 3.0 px of an opposite-charge singularity in no more than 50% of its frames. Sensitivity: baseline 150, 75, 38, 121 frames x sigma 0.5, 1.0, 2.0 px, and tracker variants. All thresholds and criteria are provisional pending review by a domain scientist.

Verdict

Verdict: descriptive reporting is allowed, but physiology_ok is not computable because there are no cited physiology ranges for the stable checked metrics; the stable reportable descriptors are singularity_frames_frac 1.0 and dominant_freq_hz 40.294 Hz, while persistent_rotors and persistent_rotor_tracks are unstable and should be reported only as 204.0–464.0, and persistent_rotor_count_max only as 9.0–21.0, not as single values. Tracker variants found 250, 303, and 450 persistent rotors, with the rule verdicts agreeing, and persistence-threshold variants were not applicable because there were no segment expectations. Review is needed for the preprocessed deposit, polarity transformed relative to dye, SNR dependence on preprocessing, provisional reference thresholds, and the risk of false phase singularities in this same rat deposit discussed in DOI 10.1371/journal.pcbi.1013963. The ranges, the stability threshold of 0.25 x median, and the criteria are provisional.
physiology_ok: None; send back: False. Reviewer sign-off: pending.

Parameters (as run)

```
% Rat whole heart optical mapping (Zenodo 18319102), v1, read-only
% set by developer (not a domain scientist); provisional, REVIEW_NEEDED 16
baseline_frames = 121;      % >= 2 x slowest cycle (26, images): ok
pad_frames      = 200;      % each side, outside the window
spatial_sigma   = 1.0;      % px, Gaussian, phase only
spatial_truncate = 4.0;      % kernel radius, sigma
lowpass         = [];       % none
polarity        = 1;        % measured, skew of dV/dt
rotor_threshold = 0.9;      % turns, |winding| per plaque
rotor_erode_px  = 3;        % px from tissue edge ignored
link_px         = 4.0;      % tracking, max step per frame
max_gap         = 5;        % frames a track may vanish
min_cycles      = 1.0;      % own rotations, min_frames = 25
pair_dist_px    = 3.0;      % opposite-charge pairing
paired_frac     = 0.5;      % max paired fraction of a track
render_step     = 4;        % movie only
```

Segments

Segment	Defined	Analysed	Cycle, frames	Expected rotors	Bounded by
Ventricular fibrillation (whole recording)	0-3,800	200-3,600	26 (86% of pixels)	not stated	recording start → recording end

Metrics

Metric	Unit	Ventricular fibrillation (whole recording)	Physiological range
Rhythm			
Dominant frequency	Hz	40.294	none cited
Rotors			
Persistent rotors	count	204-464 (unstable)	none cited
Max concurrent persistent rotors	count	9-21 (unstable)	none cited
Frames with a singularity	fraction	1.000	none cited
Beats, where a global rhythm exists			
Beats	count	0	none cited
Global amplitude ratio	ratio	0.28	gate ≥ 0.30 provisional
APD50	ms	no global beat	none cited
APD90	ms	no global beat	none cited
Conduction velocity	cm/s	no global beat	none cited

Criteria and reportable values

Item	Rule or segment	Result
Design expectations	none stated for this recording's segments	no criterion to test; counts are descriptive (provisional)
persistent rotor tracks	all	204-464 count, unstable, not reportable
dominant freq (Hz)	whole recording	40.29 Hz, no cited range
persistent rotors	whole recording	204-464 count, unstable, not reportable
singularity frames fraction	whole recording	1 fraction of frames, no cited range
persistent rotor count max	whole recording	9-21 count, unstable, not reportable

Provisional rules behind this signature

Rule	Description	Expert	Status
protocol_parameter_set worker/voltage/protocol_params.py (developer_defaults, set_params)	Each protocol's fixed, versioned analysis parameters (version 1 = developer defaults); no run or agent may deviate	optical mapping analyst	provisional
baseline_window_rule worker/voltage/baseline_rule.py (FACTOR, evaluate)	A run proceeds only if the protocol's baseline window is $\geq 2\times$ the slowest segment's cycle, the cycle from the MAP channel when a DAQ log exists, else from per-pixel dominant frequency on linearly detrended pixels; otherwise the run is held by code	optical mapping analyst	provisional
filter_defaults worker/voltage/preprocess.py (Params)	Default baseline window (frames) and spatial Gaussian sigma/truncate for phase	optical mapping analyst (cardiac electrophysiology)	provisional
tissue_mask worker/voltage/io.py (tissue_mask)	Tissue = not NaN in frame 0 and nonzero temporal std	optical mapping analyst	provisional
polarity worker/voltage/preprocess.py (polarity)	Dye polarity from sign of median per-pixel skew of dV/dt	optical mapping analyst / voltage dye chemist	provisional
singularity_detection worker/voltage/preprocess.py (Params.rotor_threshold, rotor_erode_px)	Phase singularity = $ winding > \text{threshold turns}$, $\geq$ erode px from tissue edge	computational cardiac electrophysiologist (phase mapping)	provisional
rotor_persistence worker/voltage/rotors.py (TrackParams)	Track linking distance/gap and minimum lifetime for a persistent rotor	computational cardiac electrophysiologist (phase mapping)	provisional
chirality_pairing worker/voltage/rotors.py (TrackParams.pair_dist_px, paired_frac)	Opposite-charge singularities within pair distance are a pair; tracks paired most of their life are excluded from rotors	computational cardiac electrophysiologist (phase mapping)	provisional
sensitivity_grid worker/voltage/sensitivity.py (SIGMAS, BASELINE_MULTIPLES, baseline_levels)	Filter levels tested: spatial sigma and baseline window values	optical mapping analyst	provisional
analysis_window worker/voltage/runs.py (default_window)	Frames analysed: whole recording minus one filter pad at each end (unless the plan narrows it)	cardiac electrophysiologist familiar with the dataset	provisional
prior_processing_flags worker/voltage/inspect.py (prior_processing)	Thresholds for flagging depositor processing (normalization, masking, temporal/spatial smoothing)	imaging scientist (camera acquisition and noise)	provisional
physiology_reference_rates worker/voltage/physiology.py (RANGES, TOLERANCE_FRAC)	Cited physiological ranges (single-study values widened by a 25% tolerance), applied to segments by their expected rhythm; used by the critic and for frame-rate sanity checks	cardiac electrophysiologist per species	provisional

Provisional rules behind this signature

Rule	Description	Expert	Status
stability_rule worker/agents/critic.py (STABLE_FRAC, stability)	A metric is reportable only if its spread across all sensitivity settings is $\leq 25\%$ of its median (zero spread when all values are 0); otherwise 'unstable, not reportable'	biostatistician + optical mapping analyst	provisional
persistence_threshold_variants worker/agents/critic.py (persistence_variants)	The persistent-rotor rule is run at two lifetimes, one measured cycle of the fastest segment and the paper's cited rotation period; both verdicts stored, disagreement flagged	computational cardiac electrophysiologist (phase mapping)	provisional
persistent_rotor_criterion worker/voltage/sensitivity .py (MIN_ROTORS_PRESENT, setting MAX_ROTORS_ABSENT)	Persistent-rotor finding holds if every 'present' segment has ≥ 1 persistent rotor and every 'absent' segment has none, at every	cardiac electrophysiologist	provisional

Review items

Topic	Detail	Severity
unstable:whole_recording.persiste nt_rotors	The count varied across filter and tracker settings from 204.0 to 464.0, exceeding the provisional stability criterion, so it should not be reported as a single run-setting value.	warn
unstable:whole_recording.persiste nt_rotor_count_max	The maximum simultaneous count varied from 9.0 to 21.0 across filter and tracker settings, exceeding the provisional stability criterion, so it should not be reported as a single run-setting value.	warn
unstable:persistent_rotor_tracks	Persistent-rotor tracks varied from 204.0 to 464.0 across filter and tracker settings, exceeding the provisional stability criterion, so track count should not be reported as a single value.	warn
preprocessed deposit	The deposit is not raw camera data and is documented as background-subtracted, spatially binned, low-pass filtered, drift-removed, and normalized; analyses requiring raw fluorescence/counts or unfiltered noise statistics would be misleading.	warn
polarity transformed relative to dye	Measured polarity is consistently non-inverted despite RH237 normally dimming on depolarization; orienting from measured polarity is acceptable, but the transformed sign should be documented.	warn
SNR depends on preprocessing	Median SNR is high, but documented temporal filtering and detected temporal smoothing can inflate apparent SNR by reducing frame-to-frame noise.	info
reference thresholds provisional	The frame rate was taken from the deposit at 1000 Hz, but automated processing flags info and provisional rhythm/reference-rate tools should be treated as not yet domain-scientist reviewed.	
false phase singularities	A context paper for the same rat deposit warns that naive phase-singularity approaches can produce spurious rotational drivers at conduction blocks, which is directly relevant to persistent-rotor counts and tracks.	warn

Provenance

```
{
  "recording": {
    "id": "73e4ebe2-6b09-4582-a1d6-ded901b7d124",
    "label": "Rat heart, ventricular fibrillation (RG 80 nM)",
    "source": "public",
    "source_ref": "10.5281/zenodo.18319102",
    "publication_ref": "10.1093/cvr/cvaa141",
    "storage_path": "public/masked_data_RG_80nM.mat",
    "format": "mat",
    "sha256": "9e30977de373f78d1b5d236bd100e46bb79c72152d3a7516b9c03c4849391076",
    "size_bytes": 293204250,
    "license": "CC-BY-4.0",
    "attribution": "Verstraeten, Bjorn; Lootens, Sebastiaan",
    "rights_source": {
      "ref": "10.5281/zenodo.18319102",
      "url": "https://zenodo.org/records/18319102",
      "kind": "deposit_metadata",
      "creators": [
        "Verstraeten, Bjorn",
        "Lootens, Sebastiaan"
      ],
      "license_as_stated": "cc-by-4.0"
    },
    "frame_rate_hz": 1000,
    "frame_rate_source": {
      "ref": "10.5281/zenodo.18319102",
      "kind": "deposit_metadata",
      "quote": "Emitted fluorescence was recorded with high-resolution CMOS cameras at a sampling rate of 1 kHz, with a spatial resolution of 128 \u00d7 80 pixels and a pixel size of approximately 100\u2013125 \u00b5m."
    },
    "pixel_size_um": 112.5,
    "pixel_size_source": {
      "ref": "10.5281/zenodo.18319102",
      "kind": "deposit_metadata",
      "note": "midpoint of the stated 100-125 um; conduction velocities carry a +/-11% range from this alone",
      "quote": "Emitted fluorescence was recorded with high-resolution CMOS cameras at a sampling rate of 1 kHz, with a spatial resolution of 128 \u00d7 80 pixels and a pixel size of approximately 100\u2013125 \u00b5m."
    },
    "frames": 3800,
    "height": 128,
    "width": 80,
    "inverted": false
  },
  "protocol": {
    "id": "a0059cf5-fbde-4942-a18f-399ebe70e9ff",
    "name": "Rat whole heart optical mapping (Zenodo 18319102)",
    "species": "rat",
    "tissue": "whole_heart",
    "params_version": 1,
  }
}
```

```

    "params_set_by": "developer (not a domain scientist)",
    "params_note": "version 1: the library defaults as of commit 363372b; provisional, see
protocol_params.py"
},
"run": {
    "id": "e41d035d-080a-4db2-a665-c4738243cdc3",
    "status": "done",
    "started_at": "2026-10-27T23:43:21.943174+00:00",
    "finished_at": "2026-10-27T23:46:14.552158+00:00",
    "code": {
        "dirty": true,
        "git_commit": "905d5bebbb29da7ad46cd5045db14330695037c3"
    },
    "workers": null,
    "steps": [
        "load",
        "deposit_checks",
        "baseline_correct",
        "polarity",
        "spatial_filter(phase only)",
        "hilbert_phase",
        "phase_singularities",
        "track_and_pair",
        "beats_apd_cv",
        "sensitivity",
        "render"
    ],
    "protocol_params": {
        "params": {
            "link_px": 4.0,
            "max_gap": 5,
            "min_cycles": 1.0,
            "pad_frames": 200,
            "paired_frac": 0.5,
            "render_step": 4,
            "pair_dist_px": 3.0,
            "spatial_sigma": 1.0,
            "rotor_erode_px": 3,
            "baseline_frames": 121,
            "rotor_threshold": 0.9,
            "spatial_truncate": 4.0
        },
        "version": 1,
        "protocol_id": "a0059cf5-fbde-4942-a18f-399ebe70e9ff"
    },
    "baseline_rule": {
        "ok": true,
        "ratio": 4.654,
        "cycles": {
            "whole_recording": {
                "n_frames": 3800,
                "cycle_frames": 26,
                "pixels_agreeing_frac": 0.8585122699386503,
                "pixels_with_rhythm_frac": 1.0,

```

```

    "interval_quartiles_frames": [
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  "factor": 2.0,
  "reason": null,
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  "status": "provisional",
  "baseline_frames": 121,
  "slowest_segment": "whole_recording",
  "required_min_frames": 52,
  "slowest_cycle_frames": 26
},
"deposit_checks": {
  "flags": [
    {
      "flag": "unit_range",
      "value": [
        0.0,
        1.0
      ],
      "suggests": "min-max normalized",
      "threshold": "[0, 1] spanned"
    },
    {
      "flag": "non_integer",
      "value": 0.0003442292944785276,
      "suggests": "not raw camera counts (camera output is integer); weak alone",
      "threshold": 0.5
    },
    {
      "flag": "nan_mask_partial",
      "value": [
        0
      ],
      "suggests": "mask encoded in a few frames only; other frames carry non-tissue values"
    },
    {
      "flag": "temporal_smoothing",
      "value": 0.959237783400513,
      "suggests": "temporally low-pass filtered (white shot noise gives dV lag-1 autocorr
near -0.5)",
      "threshold": 0.5
    },
    {
      "flag": "spatial_smoothing",
      "value": 0.9479694003115444,
      "suggests": "spatially filtered or binned (shot noise is independent between pixels)",
      "threshold": 0.8
    }
  ],

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"status": "provisional",
"measures": {
  "max": 1.0,
  "min": 0.0,
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  "integer_frac": 0.0003442292944785276,
  "negative_frac": 0.0,
  "frames_with_nan": 1,
  "dv_lag1_autocorr_median": 0.959237783400513,
  "neighbour_dv_corr_median": 0.9479694003115444
},
"processed_before_deposit": true
},
"pipeline_check": null
},
"signature": {
  "id": "4f9dfa16-d81f-4874-be78-8c0a38938b12",
  "created_at": "2026-10-27T23:46:14.125788+00:00",
  "movie_path": "runs/e41d035d-080a-4db2-a665-c4738243cdc3/movie.mp4",
  "frames": {},
  "filter_params": {
    "mask": "not NaN in frame 0 and nonzero temporal std",
    "render": {
      "step": 4,
      "palettes": {
        "phase": "twilight",
        "camera": "gray",
        "voltage": "gray"
      }
    },
    "interpolation": "nearest"
  },
  "window": {
    "f0": 200,
    "f1": 3600,
    "segments": [
      {
        "name": "whole_recording",
        "label": "ventricular fibrillation (whole recording)",
        "defined": [
          0,
          3800
        ],
        "analysed": [
          200,
          3600
        ],
        "citation": null,
        "defined_by": "developer (no comparison defined)",
        "segment_id": "1eb0a669-d021-4b1a-a0b7-d652eaabb546",
        "end_event_id": null,
        "start_event_id": null,
        "expected_persistent_rotors": null
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    ],
  },
}
```

```

    "illumination": null,
    "frame_rate_hz": 1000.0,
    "frame_rate_source": {
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        "kind": "deposit_metadata",
        "quote": "Emitted fluorescence was recorded with high-resolution CMOS cameras at a
sampling rate of 1 kHz, with a spatial resolution of 128 \u00d7 80 pixels and a pixel size
of approximately 100\u2013125 \u00b5m."
    },
    "segment_cycles_frames": {
        "whole_recording": 25
    }
},
"lowpass": null,
"polarity": 1,
"tracking": {
    "link_px": 4.0,
    "max_gap": 5,
    "min_cycles": 1.0,
    "min_frames": 25,
    "paired_frac": 0.5,
    "pair_dist_px": 3.0
},
"pad_frames": 200,
"phase_method": "angle of scipy.signal.hilbert along time, on spatially filtered signal",
"spatial_sigma": 1.0,
"rotor_erode_px": 3,
"spatial_method": "scipy.ndimage.gaussian_filter per frame, mode=reflect; NaN set to 0
before filtering, non-tissue zeroed after",
"baseline_frames": 121,
"baseline_method": "scipy.ndimage.uniform_filter1d, mode=reflect, subtracted per pixel",
"polarity_method": "sign of median per-pixel skew of dV/dt on baseline-corrected signal",
"rotor_threshold": 0.9,
"spatial_truncate": 4.0,
"spatial_applies_to": "phase/activation only; displayed voltage is baseline-corrected
only"
},
"criteria_status": {
    "note": null,
    "rules": [
        {
            "id": "protocol_parameter_set",
            "expert": "optical mapping analyst",
            "status": "provisional",
            "values": {
                "set_by": "developer (not a domain scientist)",
                "protocol": "Rat whole heart optical mapping (Zenodo 18319102)",
                "protocol_id": "a0059cf5-fbde-4942-a18f-399ebe70e9ff",
                "params_version": 1
            }
        }
    ],
    "decision": null,
    "location": "worker/voltage/protocol_params.py (developer_defaults, set_params)",
    "reviewed": false,
    "reviewer": null,

```

```

    "description": "Each protocol's fixed, versioned analysis parameters (version 1 =
developer defaults); no run or agent may deviate",
    "reviewed_at": null
},
{
    "id": "baseline_window_rule",
    "expert": "optical mapping analyst",
    "status": "provisional",
    "values": {
        "ok": true,
        "factor": 2.0,
        "source": "per-pixel dominant frequency (images)",
        "required_min_frames": 52,
        "slowest_cycle_frames": 26
    },
    "decision": null,
    "location": "worker/voltage/baseline_rule.py (FACTOR, evaluate)",
    "reviewed": false,
    "reviewer": null,
    "description": "A run proceeds only if the protocol's baseline window is >= 2x the
slowest segment's cycle, the cycle from the MAP channel when a DAQ log exists, else from
per-pixel dominant frequency on linearly detrended pixels; otherwise the run is held by
code",
    "reviewed_at": null
},
{
    "id": "filter_defaults",
    "expert": "optical mapping analyst (cardiac electrophysiology)",
    "status": "provisional",
    "values": {
        "lowpass": null,
        "spatial_sigma": 1.0,
        "baseline_frames": 121,
        "spatial_truncate": 4.0
    },
    "decision": null,
    "location": "worker/voltage/preprocess.py (Params)",
    "reviewed": false,
    "reviewer": null,
    "description": "Default baseline window (frames) and spatial Gaussian sigma/truncate
for phase",
    "reviewed_at": null
},
{
    "id": "tissue_mask",
    "expert": "optical mapping analyst",
    "status": "provisional",
    "values": {
        "rule": "not NaN in frame 0 and nonzero std",
        "tissue_pixels": 5216
    },
    "decision": null,
    "location": "worker/voltage/io.py (tissue_mask)",
    "reviewed": false,

```

```

    "reviewer": null,
    "description": "Tissue = not NaN in frame 0 and nonzero temporal std",
    "reviewed_at": null
  },
  {
    "id": "polarity",
    "expert": "optical mapping analyst / voltage dye chemist",
    "status": "provisional",
    "values": {
      "method": "median skew of dV/dt",
      "result": 1
    },
    "decision": null,
    "location": "worker/voltage/preprocess.py (polarity)",
    "reviewed": false,
    "reviewer": null,
    "description": "Dye polarity from sign of median per-pixel skew of dV/dt",
    "reviewed_at": null
  },
  {
    "id": "singularity_detection",
    "expert": "computational cardiac electrophysiologist (phase mapping)",
    "status": "provisional",
    "values": {
      "rotor_erode_px": 3,
      "rotor_threshold": 0.9
    },
    "decision": null,
    "location": "worker/voltage/preprocess.py (Params.rotor_threshold, rotor_erode_px)",
    "reviewed": false,
    "reviewer": null,
    "description": "Phase singularity = |winding| > threshold turns, >= erode px from
tissue edge",
    "reviewed_at": null
  },
  {
    "id": "rotor_persistence",
    "expert": "computational cardiac electrophysiologist (phase mapping)",
    "status": "provisional",
    "values": {
      "link_px": 4.0,
      "max_gap": 5,
      "min_cycles": 1.0,
      "min_frames": 25
    },
    "decision": null,
    "location": "worker/voltage/rotors.py (TrackParams)",
    "reviewed": false,
    "reviewer": null,
    "description": "Track linking distance/gap and minimum lifetime for a persistent
rotor",
    "reviewed_at": null
  },
  {

```

```

    "id": "chirality_pairing",
    "expert": "computational cardiac electrophysiologist (phase mapping)",
    "status": "provisional",
    "values": {
        "paired_frac": 0.5,
        "pair_dist_px": 3.0
    },
    "decision": null,
    "location": "worker/voltage/rotors.py (TrackParams.pair_dist_px, paired_frac)",
    "reviewed": false,
    "reviewer": null,
    "description": "Opposite-charge singularities within pair distance are a pair; tracks
paired most of their life are excluded from rotors",
    "reviewed_at": null
},
{
    "id": "sensitivity_grid",
    "expert": "optical mapping analyst",
    "status": "provisional",
    "values": {
        "sigmas": {
            "light": 0.5,
            "default": 1.0,
            "heavier": 2.0
        },
        "trackers": {
            "loose": [
                6.0,
                10
            ],
            "strict": [
                2.0,
                1
            ],
            "default": [
                4.0,
                5
            ]
        },
        "baselines": {
            "run": 121,
            "3x_cycle": 75,
            "6x_cycle": 150,
            "1.5x_cycle": 38
        }
    },
    "decision": null,
    "location": "worker/voltage/sensitivity.py (SIGMAS, BASELINE_MULTIPLES,
baseline_levels)",
    "reviewed": false,
    "reviewer": null,
    "description": "Filter levels tested: spatial sigma and baseline window values",
    "reviewed_at": null
},

```

```

{
  "id": "analysis_window",
  "expert": "cardiac electrophysiologist familiar with the dataset",
  "status": "provisional",
  "values": {
    "f0": 200,
    "f1": 3600
  },
  "decision": null,
  "location": "worker/voltage/runs.py (default_window)",
  "reviewed": false,
  "reviewer": null,
  "description": "Frames analysed: whole recording minus one filter pad at each end
(unless the plan narrows it)",
  "reviewed_at": null
},
{
  "id": "prior_processing_flags",
  "expert": "imaging scientist (camera acquisition and noise)",
  "status": "provisional",
  "values": {
    "flags": [
      "unit_range",
      "non_integer",
      "nan_mask_partial",
      "temporal_smoothing",
      "spatial_smoothing"
    ],
    "thresholds": {
      "int_frac": 0.5,
      "neg_frac": 0.01,
      "dv_autocorr": 0.5,
      "neighbour_corr": 0.8
    }
  },
  "decision": null,
  "location": "worker/voltage/inspect.py (prior_processing)",
  "reviewed": false,
  "reviewer": null,
  "description": "Thresholds for flagging depositor processing (normalization, masking,
temporal/spatial smoothing)",
  "reviewed_at": null
},
{
  "id": "physiology_reference_rates",
  "expert": "cardiac electrophysiologist per species",
  "status": "provisional",
  "values": {
    "ranges": [],
    "tolerance_frac": 0.25,
    "segment_rhythm_rule": "expected persistent rotors 'present' -> spiral arrhythmia"
  },
  "decision": null,
  "location": "worker/voltage/physiology.py (RANGES, TOLERANCE_FRAC)",

```

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    "reviewed": false,
    "reviewer": null,
    "description": "Cited physiological ranges (single-study values widened by a 25%
tolerance), applied to segments by their expected rhythm; used by the critic and for frame-
rate sanity checks",
    "reviewed_at": null
},
{
    "id": "stability_rule",
    "expert": "biostatistician + optical mapping analyst",
    "status": "provisional",
    "values": {
        "unstable": [
            "whole_recording.persistent_rotors",
            "whole_recording.persistent_rotor_count_max",
            "persistent_rotor_tracks"
        ],
        "stable_frac": 0.25
    },
    "decision": null,
    "location": "worker/agents/critic.py (STABLE_FRAC, stability)",
    "reviewed": false,
    "reviewer": null,
    "description": "A metric is reportable only if its spread across all sensitivity
settings is <= 25% of its median (zero spread when all values are 0); otherwise 'unstable,
not reportable'",
    "reviewed_at": null
},
{
    "id": "persistence_threshold_variants",
    "expert": "computational cardiac electrophysiologist (phase mapping)",
    "status": "provisional",
    "values": {
        "measured_cycle": 25,
        "paper_rotation": null
    },
    "decision": null,
    "location": "worker/agents/critic.py (persistence_variants)",
    "reviewed": false,
    "reviewer": null,
    "description": "The persistent-rotor rule is run at two lifetimes, one measured cycle
of the fastest segment and the paper's cited rotation period; both verdicts stored,
disagreement flagged",
    "reviewed_at": null
},
{
    "id": "persistent_rotor_criterion",
    "expert": "cardiac electrophysiologist",
    "status": "provisional",
    "values": {
        "max_absent": 0,
        "min_present": 1
    },
    "decision": null,

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    "location": "worker/voltage/sensitivity.py (MIN_ROTORS_PRESENT, MAX_ROTORS_ABSENT)",
    "reviewed": false,
    "reviewer": null,
    "description": "Persistent-rotor finding holds if every 'present' segment has >= 1
persistent rotor and every 'absent' segment has none, at every setting",
    "reviewed_at": null
  }
],
"status": "provisional",
"all_reviewed": false,
"superseded_by_run": null
}
},
"segments": [
{
  "id": "1eb0a669-d021-4b1a-a0b7-d652eaabb546",
  "position": 1,
  "name": "whole_recording",
  "label": "ventricular fibrillation (whole recording)",
  "start_frame": 0,
  "end_frame": 3800,
  "expected_persistent_rotors": null,
  "definition": "whole recording; no events detected or logged",
  "defined_by": "developer (no comparison defined)",
  "citation": null,
  "evidence": {},
  "provisional": true
}
],
"events": []
}
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