

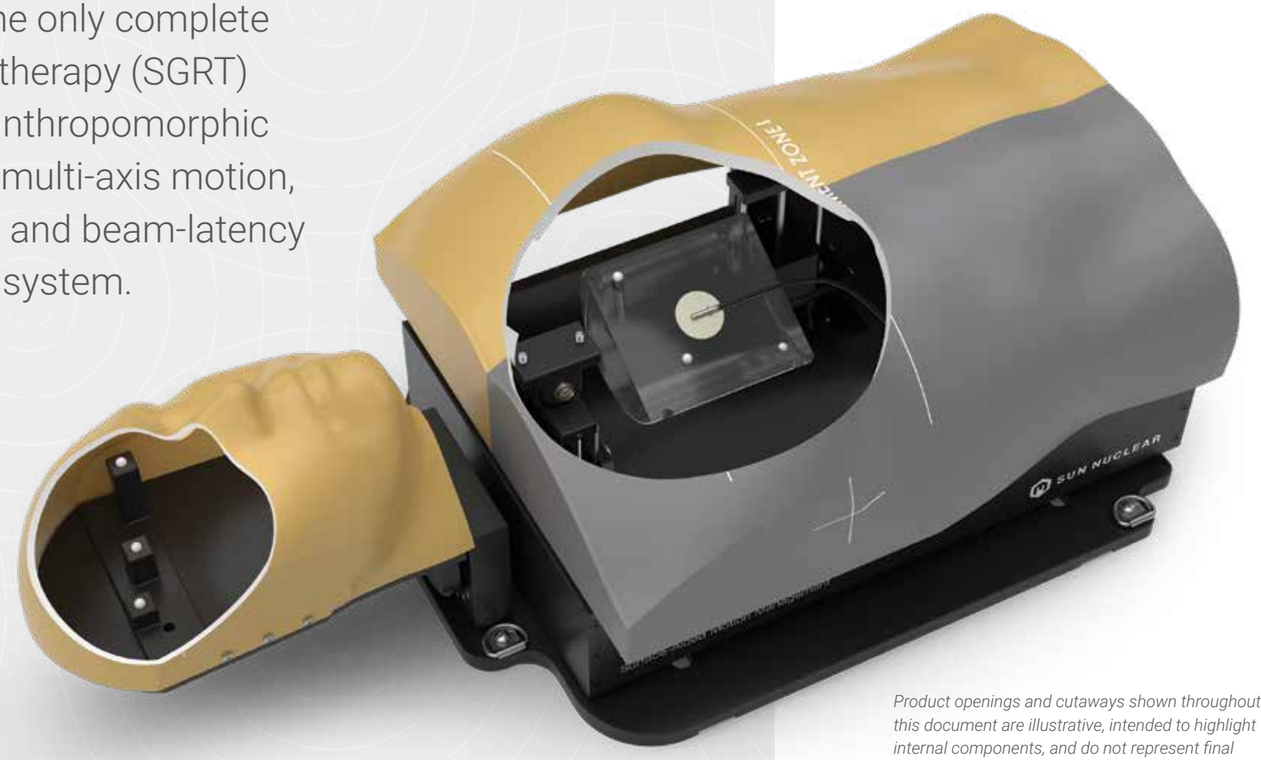

# SAMM™ Phantom

## Surface-Aided Motion Management for Advanced SGRT QA

SUN NUCLEAR
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# One Phantom for Advanced SGRT QA

The SAMM phantom is the only complete surface-guided radiation therapy (SGRT) QA solution to combine anthropomorphic surfaces, programmable multi-axis motion, moving-target dosimetry, and beam-latency measurement in a single system.




*Product openings and cutaways shown throughout this document are illustrative, intended to highlight internal components, and do not represent final external product design.*



SAMM™ Phantom

## Self-contained, Advanced SGRT QA

Commissioning complex SGRT workflows — including gating, deep inspiration breath-hold (DIBH), and motion tracking — is essential to a modern radiation therapy program and typically requires multiple separate tools. The SAMM Phantom brings positioning, motion, dosimetry, and latency testing into one self-contained system, built to support AAPM Task Groups 147 and 302 and ESTRO-ACROP SGRT standards.

### All-in-One SGRT QA

- One system for positioning, motion, dosimetry, and latency — no coordination, setup and configuration of tools from separate vendors
- Embedded diode and electrometer measure dose and characterize beam latency during gated and motion-managed treatments
- Correlated surface-and-target motion emulates a tumor moving with respiratory patterns, validating the full delivery chain in one setup

### Task Group & Accreditation Ready

- Built to run AAPM TG-147, TG-302 and ESTRO-ACROP SGRT QA tests
- Supports repeatable positioning, repositioning, and realignment testing for head and body workflows
- Quantifies beam-on and beam-off response times, addressing temporal accuracy and motion-management testing for beam-latency QA

### Clinically Realistic SGRT Testing

- Realistic anatomy and engineered surface materials reflect real clinical and optical tracking performance
- Detailed head and torso contours support accurate positioning, registration, and tracking workflows
- One surface covers cranial and thoracic workflows, so breath-hold, gating, and tracking scenarios all validate against the same anatomy

**On the following pages, learn how the SAMM Phantom enhances confidence in SGRT workflows >**



## Head Workflows

- **Test SGRT and IGRT coincidence** with multi-tiered targets
- **Evaluate rotational setup and correction accuracy:** Simulates clinically relevant head roll scenarios to assess system detection, registration, and repositioning performance
- **Validate patient repositioning and isocenter recovery workflows:** Supports repeatable setup, repositioning, and realignment tests to verify SGRT system accuracy throughout the treatment workflow



## Programmable Respiratory Motion

- Supports common respiratory waveforms and patient-specific breathing patterns
- Includes DIBH workflows for breath-hold commissioning and QA
- Creates repeatable motion scenarios for gating, tracking, and SGRT validation




## Controller with Integrated Electrometer

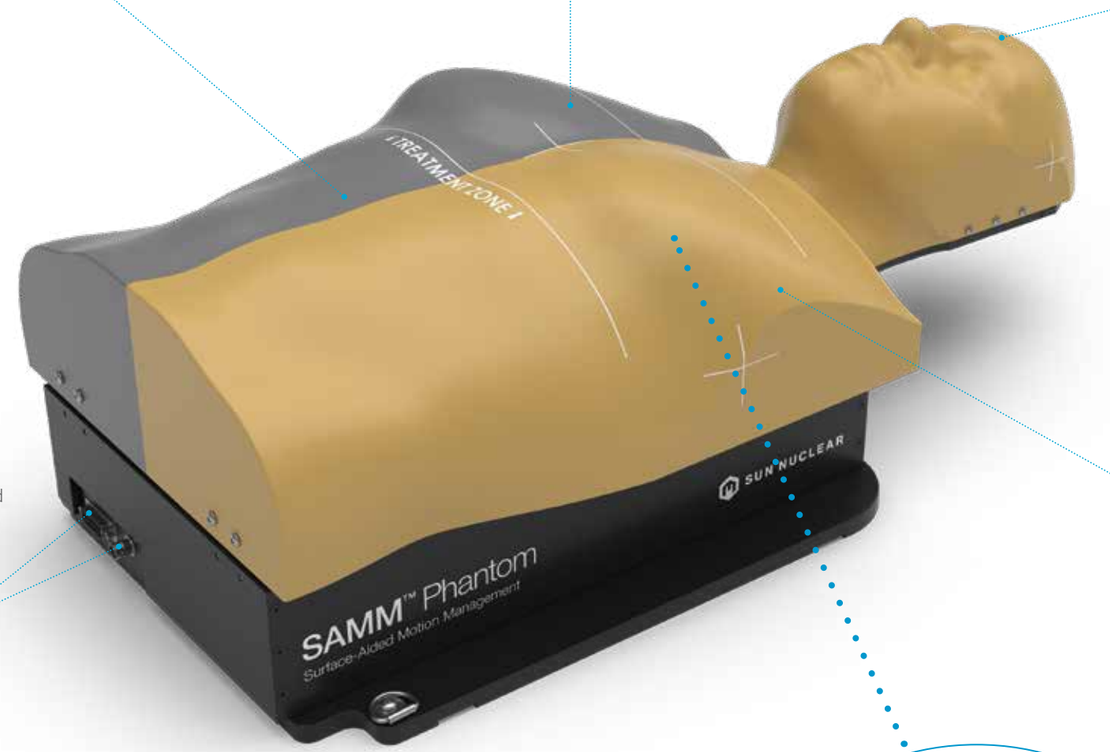
- Integrated electrometer for streamlined moving-target dosimetry
- Dedicated latency circuitry isolates and quantifies treatment delivery response time
- Unified platform for motion generation, dose measurement, and beam latency testing

## Skin Tone Detectability

- Dark and light skin tones support registration, tracking and alignment validation across a range of patient presentations

## Anthropomorphic Torso Surface

- Representative patient surface topology for thoracic SGRT applications




## Anthropomorphic Head Geometry

- Realistic facial anatomy for SGRT positioning and repositioning
- 3-axis scribing for laser localization
- Test head-roll accuracy via manual adjustments

## Multi-Axis Torso Motion

- Dual-axis pitch and roll motion for realistic respiratory simulation
- Correlated internal target and surface motion throughout the breathing cycle
- Complex multi-dimensional target trajectories for advanced SGRT and motion-management QA
- Purpose-built for gating, tracking, and breath-hold commissioning workflows

## Motion & Detector Ports

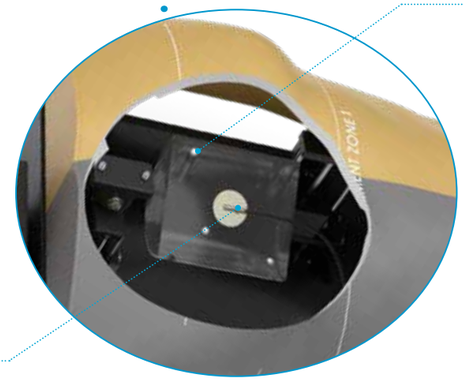
- Data communication interface for programmed motion
- Triaxial cable interface for ISORAD™ diode connection

## High-Contrast Targets

- 3-cm calcium (100 mg/ml) tumor target
- Ceramic BB fiducials for localization tests

## Embedded Diode

- Integrated ISORAD™ diode enables direct measurement of dose delivered to a moving target during motion-managed treatments
- Supports beam latency evaluation by correlating phantom motion with beam-on and beam-off events during gated delivery



## Motion Control Software

Motion Control software handles the full QA workflow — waveform configuration, relative and absolute dosimetry, and beam-latency measurement — in one application. Users can import or select from preset waveforms, including clinically relevant, patient-specific traces from any major SGRT tracking system. Built-in editing, smoothing, and analysis tools simplify waveform optimization, and every waveform can be saved for reuse. Real-time waveform data displays for each direction of the simulated tumor's motion.

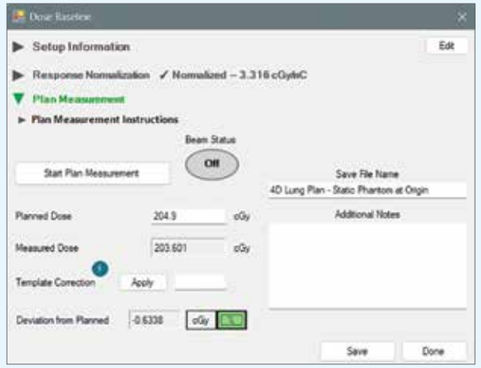







## Dosimetry Module

Measure, compare, and validate motion-managed treatments with confidence. The Dosimetry Module enables both relative and absolute dosimetry using the embedded ISORAD diode, allowing users to establish baseline performance and evaluate treatment delivery consistency over time.



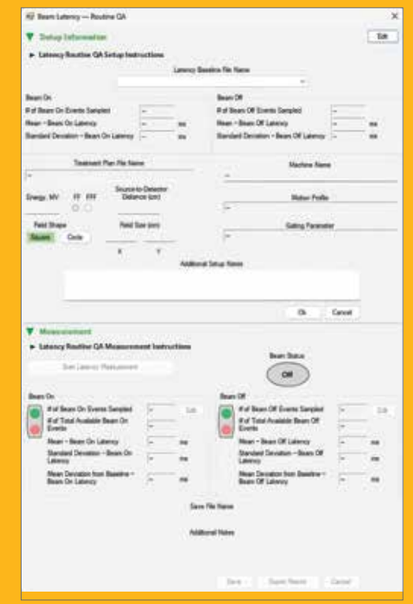

### Key Features

- Relative and absolute* dose measurements
- Baseline establishment and performance trending
- Supports gating, tracking, and DIBH evaluations

**Normalization workflow provided.*

## Latency Module

Quantify treatment delivery response times with confidence. The Latency Module measures beam-on and beam-off events, calculates mean and standard deviation latency values in milliseconds, and enables comparison against saved baselines to track system performance over time.



### Key Features

- Beam-on and beam-off latency analysis
- Mean and standard deviation calculations
- Baseline storage and comparison tools

# Global Standards Compliance

## AAPM TG-302

- System performance validation
- Geometric accuracy
- Multi-institutional consistency

## AAPM TG-147

- Mechanical and dosimetric accuracy
- End-to-end system testing
- Independent verification

## ESTRO-ACROP

- Geometric accuracy
- System stability
- Baseline and ongoing QA
- Commissioning support

# Technical Details

## General

| | |
|---|---|
| **Phantom Body (Head + Torso)** | |
| Dimensions: | 28.1" x 13.7" x 9.4" (715 x 350 x 240 mm) |
| Weight: | 23.2 lbs (11 kg) |
| MRI Compatibility: | MR Unsafe |

## Software

| | |
|---|---|
| Application (included): | Motion Control |
| PC: | Not Included |
| RAM: | ≥ 16 GB |
| Hard Drive Space: | ≥ 8 GB |
| Operating System: | Windows 11 Pro; Windows 11 Enterprise |
| Display Resolution: | 1920 x 1080p |

## Beam Latency

| | |
|---|---|
| Beam off detect time: | < 23 ms from last radiation pulse |
| Detect pulse frequency range: | 60–400 Hz (Linac) |
| Detect dose-per-pulse range: | 0.033–5.5 cGy/pulse |
| Output signal: | < 0.3 VDC (beam off)<br>> 9.7 VDC (beam on) |

## Controller

| | |
|---|---|
| Overall Dimensions (LxWxH): | 10.7" x 8.5" x 5.8 in (275 x 220 x 150 mm) |
| Weight: | 8.6 lbs (4 kg) |
| Power: | 110-250VAC, 50/60 Hz (auto-switching) |
| **Communication Ports** | |
| Motion Drive: | DB15 (1x) |
| Dosimetry: | Triaxial (1x) |
| Latency: | Coaxial with Triaxial adapter (1x) |
| Data 1: | Ethernet RJ45 |
| Data 2: | PDI 3.0 (or greater) |
| Electrometer: | Included (embedded) |

## Torso Motion

| | |
|---|---|
| Degrees of Freedom: | Pitch, Roll |
| Type: | Motorized |
| Speed: | 1-30 mm/s |
| Rotational Range: | 0 - 5° Pitch<br>0 - 5° Roll |
| Positional Accuracy: | ≤0.5 mm<br>±0.25° |
| Cycle Time: | 1 - ∞ (adjusted based on amplitude) |
| Waveforms: | sin(t), -1 + 2cos⁴(t), -1 + 2cos⁶(t), sawtooth, sharkfin, DIBH |

## Torso Features

| | |
|---|---|
| **Surface Colors** | |
| Left: | Matte Ochre Brown |
| Right: | Matte Gray |
| **Internal Compartment** | |
| Material: | PMMA |
| Shape: | Cylinder |
| Size: | Φ100 mm x 111 mm |
| **IGRT/SGRT Localization** | |
| Targets (3x): | Ceramic ball bearing, Φ 6.35 mm |
| Arrangement: | Multi-target Non-coplanar Fiducials |
| **Dosimetry** | |
| Tumor-emulating Target: | Sphere Φ 30.0 mm |
| Target Material: | 100 mg/cc Calcium TMM |
| Dosimeter (embedded): | ISORAD™ Diode |

## Head Motion

| | |
|---|---|
| Degree(s) of Freedom: | Roll |
| Type: | Manual Adjust |
| Discrete Roll Increments: | 0°, 5°, 10°, 15°, 30°, 45°, 60° (CW/CCW) |

## Head Features

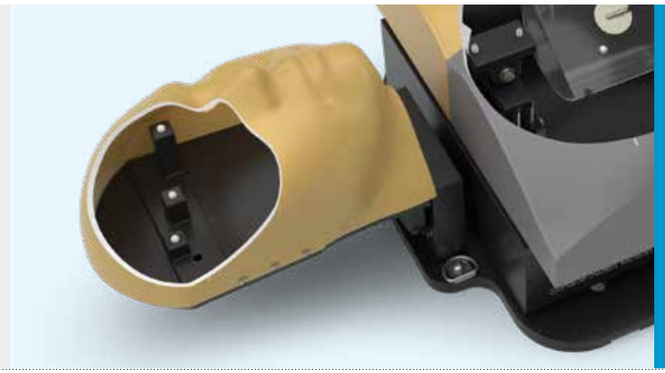
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Product availability varies by region and is subject to local regulatory approval and distributor arrangements. Please contact your local representative to confirm availability in your market.














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