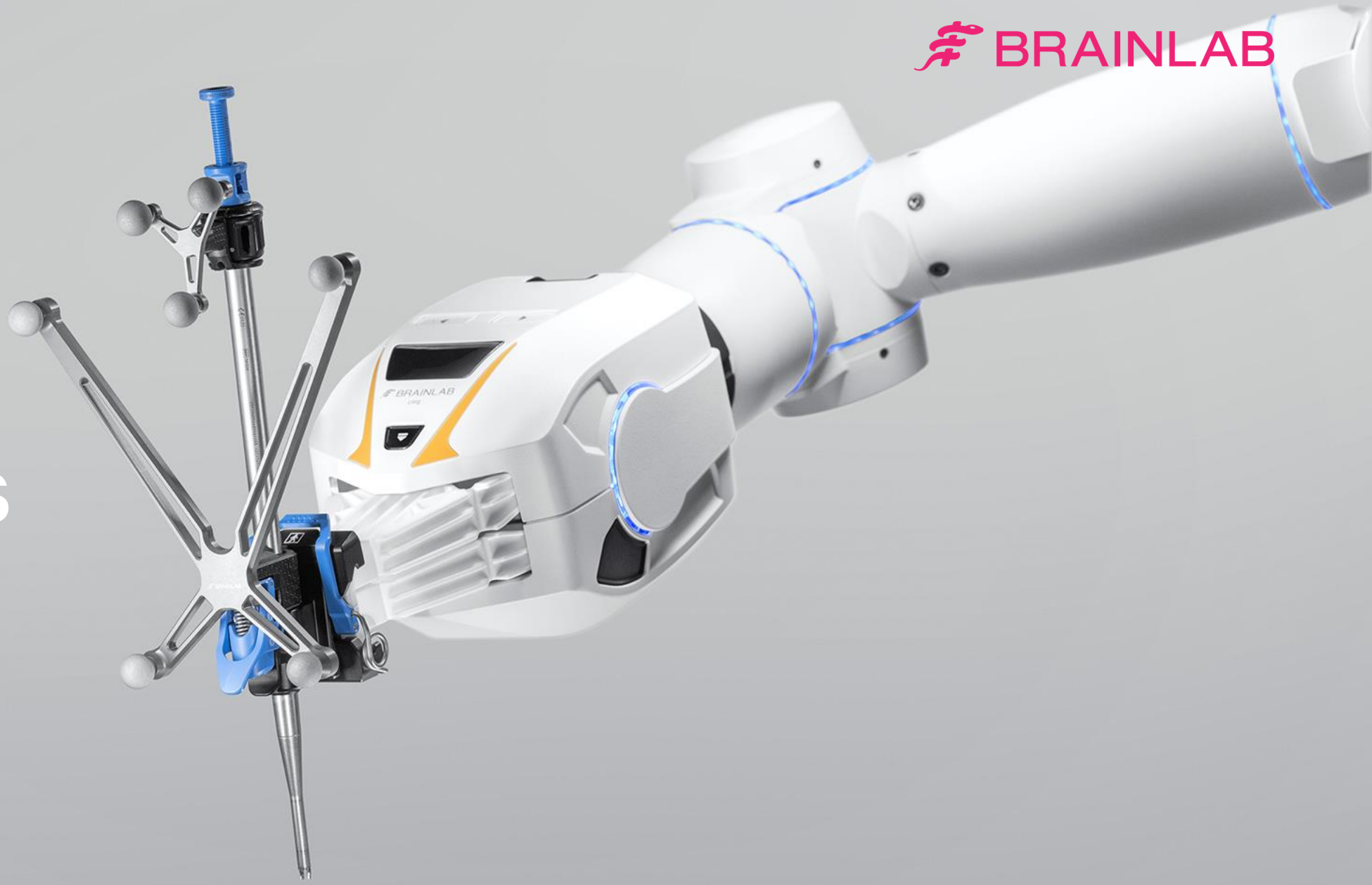
BRAINLAB

Cirq®

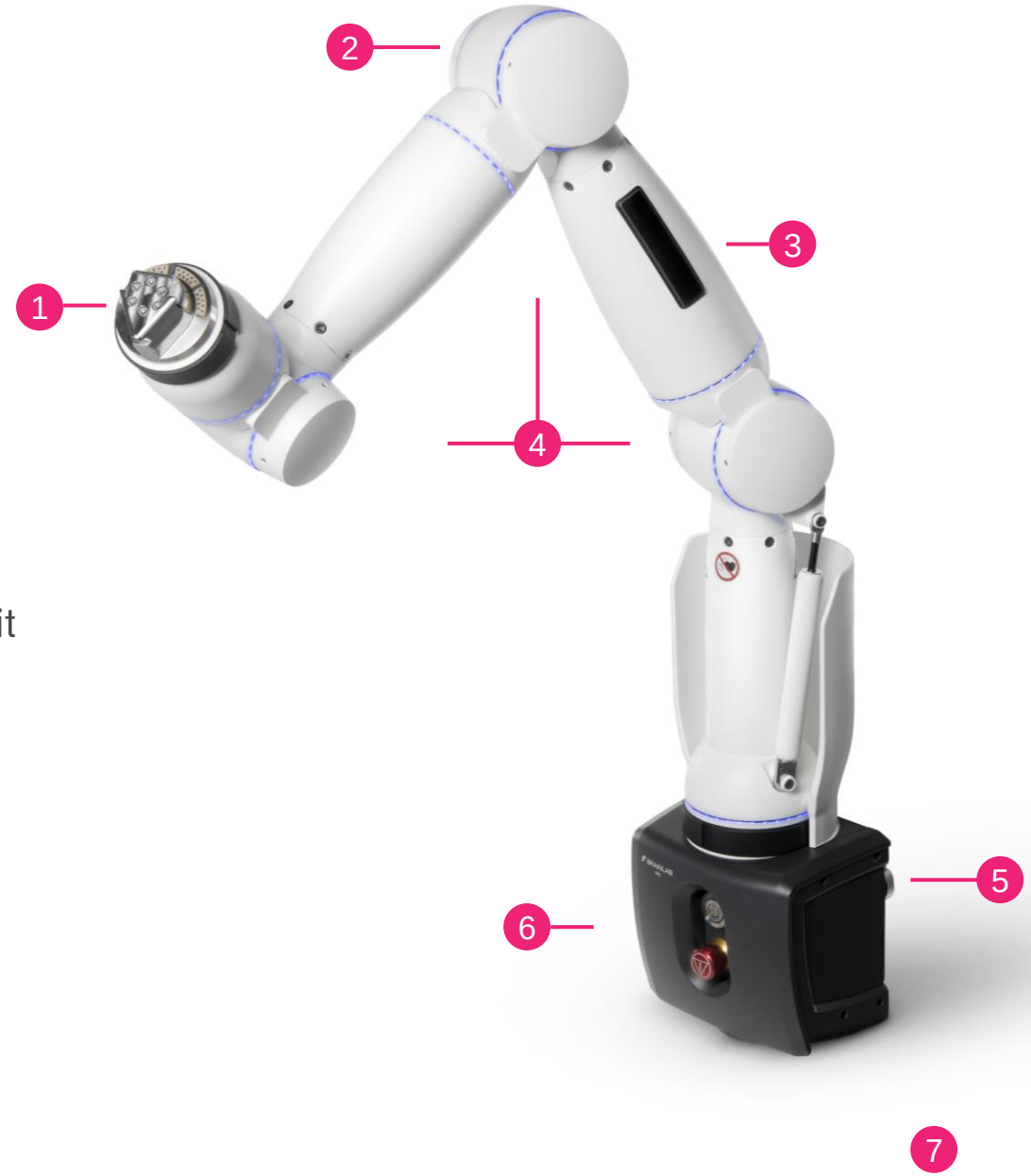
robotics



Cirq Arm System

Robotic platform in a sleek design

1. Port for different modules
2. LEDs indicate system status
3. Integrated grip sensors unlock individual joints
4. 7 degrees-of-freedom for highest flexibility
5. Stable attachment to standard O.R. table side rails
6. Fully integrated design without external computing unit
7. Portable, light-weight design, no footprint



Modularity

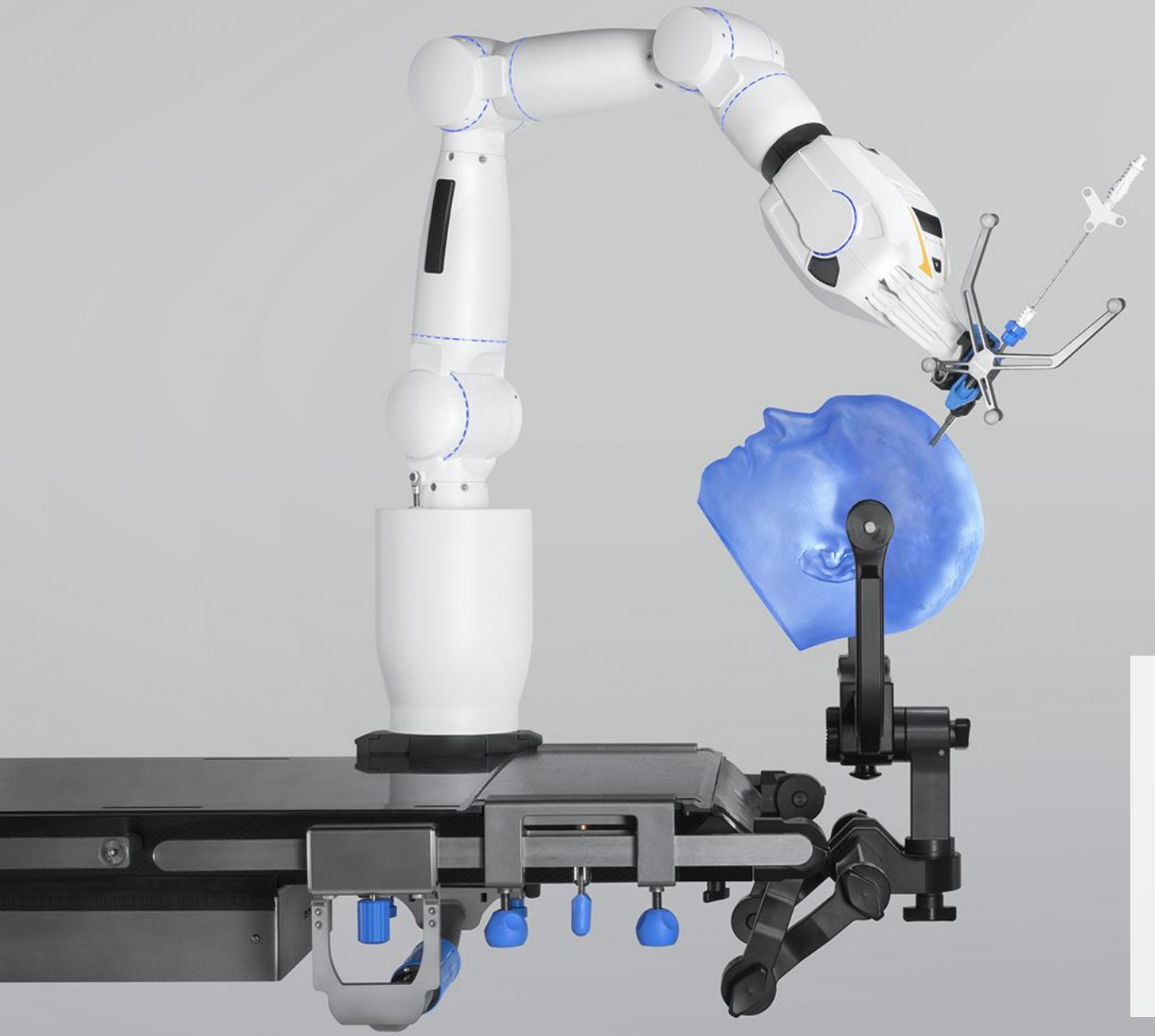
- Allows usage in different clinical specialties
- Future-proof upgrades

Large Range of Motion

- Possibility to work on wide area, long reconstruction in spine
- Additional flexibility in O.R. setups

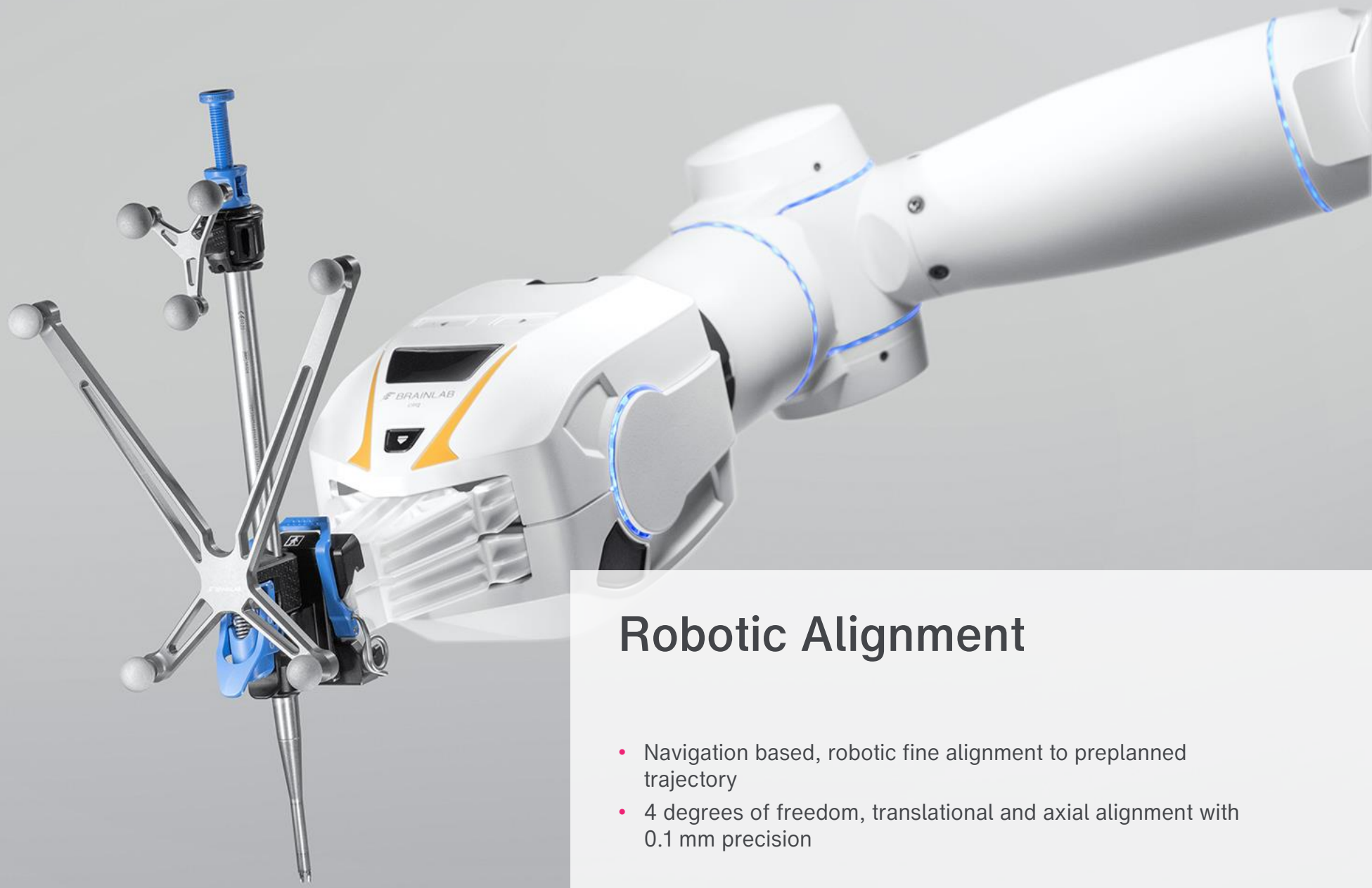
No Footprint

- Freedom to access patient
- Flexibility for different O.R. setups
- No physical obstruction through table-mounted design



Easy Setup

- Slim design and direct attachment to the table rails
- Minimize setup time in the O.R

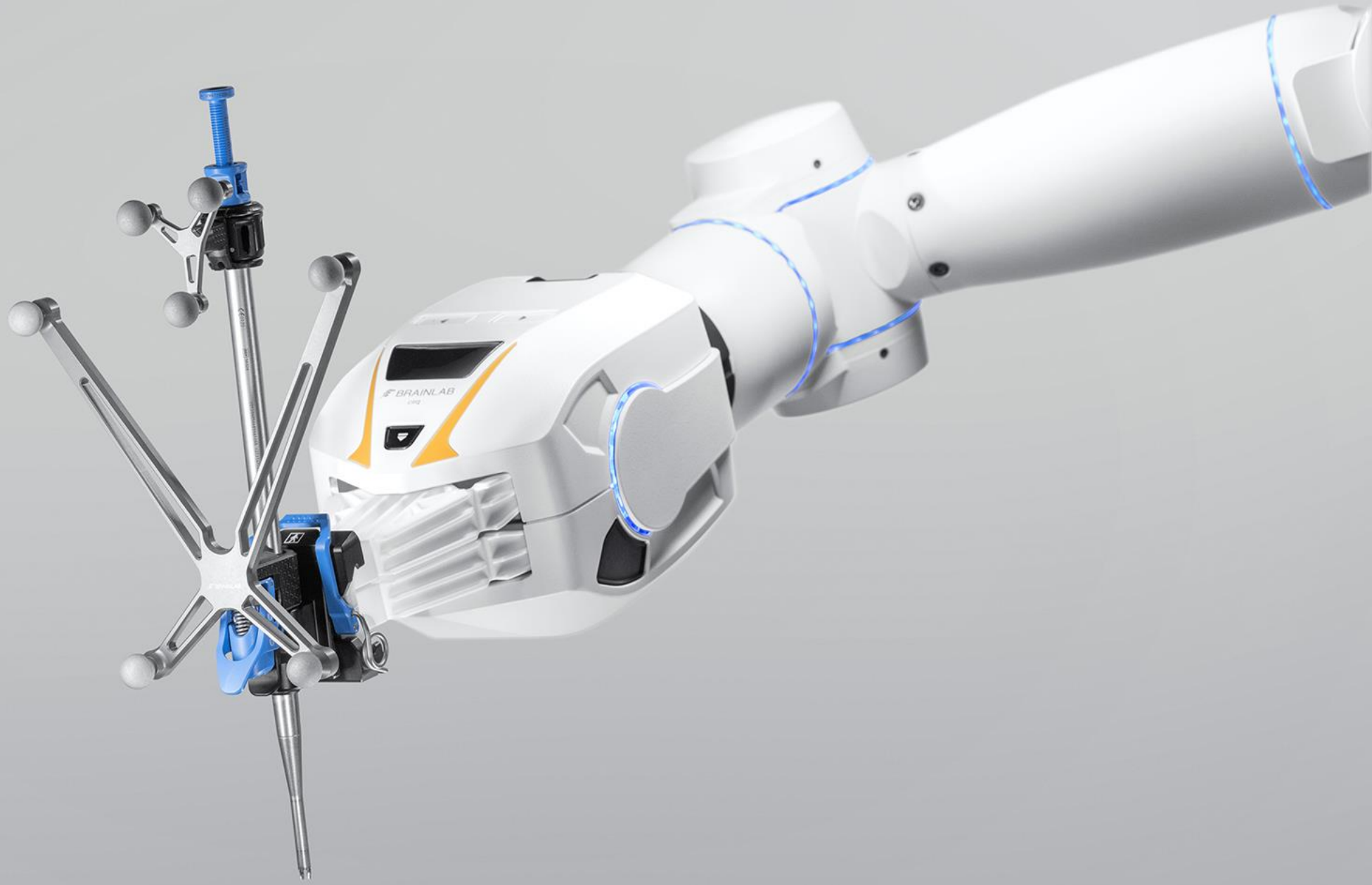


Robotic Alignment

- Navigation based, robotic fine alignment to preplanned trajectory
- 4 degrees of freedom, translational and axial alignment with 0.1 mm precision

01.

Spine



Cirq

Instrument holder module spine

- Seamless workflow with navigation-ready instruments including tissue protecting trocar for minimally-invasive surgery
- Provides stable procedure support when locked in place after alignment and with sharp teeth anchoring on the bone
- Separates the tasks of trajectory alignment and drilling by providing a stable working channel after locking the position
- Vendor-neutral compatibility with multiple implant sets
- Mainly reusable components keep disposable costs per case to a minimum

Cirq Robotic Alignment Module

Automatically aligns to preplanned trajectories for a standardized pedicle-screw placement

Instrumentation

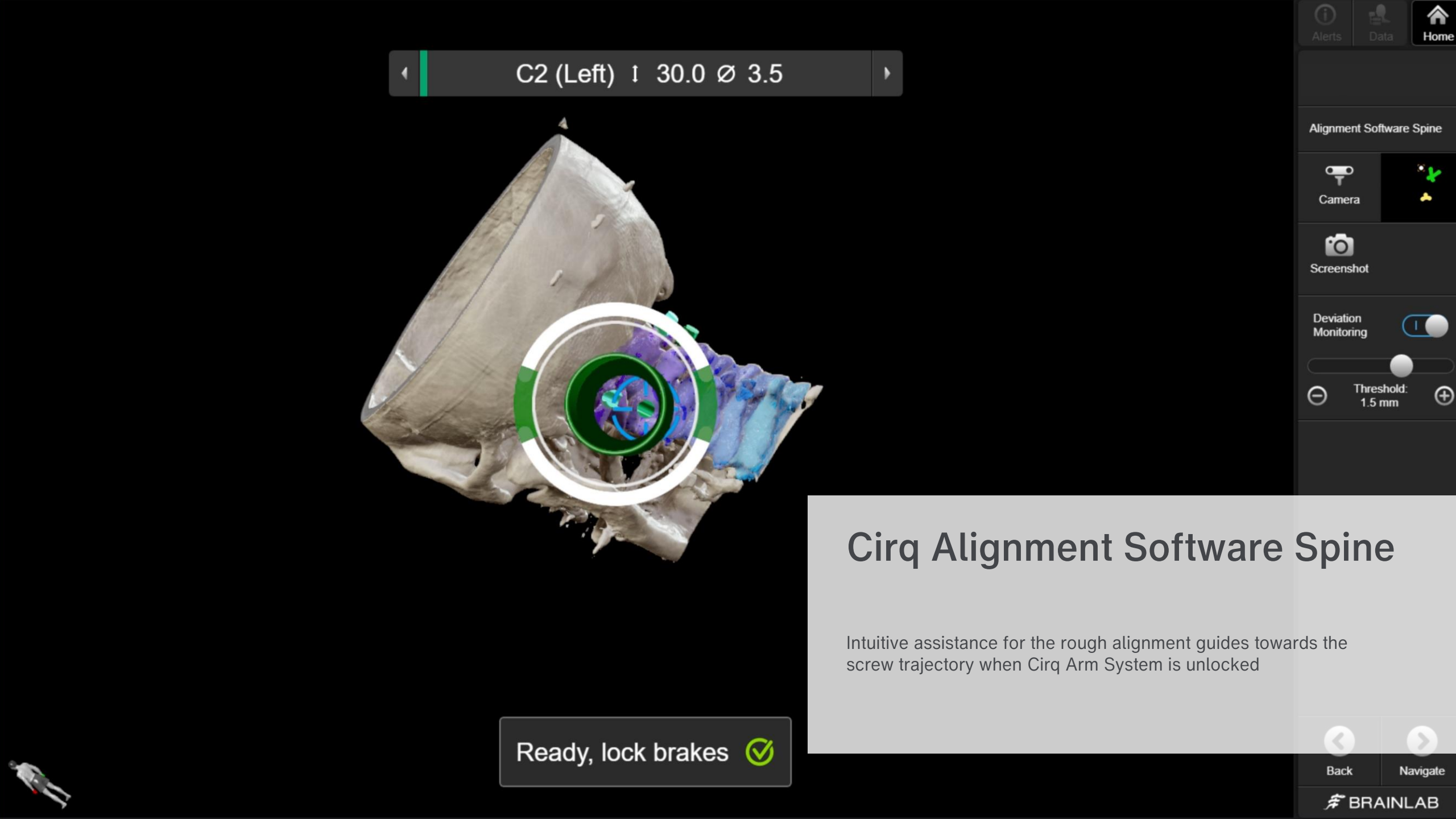
Facilitating a pressure-less workflow

- **Slim drill guide**
  - Depth tracking for accuracy validation
  - Three diameters for different pedicle sizes
  - Sharp tip and trocar for mechanical locking of entry point
- **Large tracking array**
  - Rotation allows orientation towards the navigation camera
  - Slot for quick K-wire removal
- **Disposable kinematic unit and drape**
  - Solid state hinges to remove mechanical play
  - Sterile barrier for collaborative interaction with the robot

Cirq Robotic Alignment Module

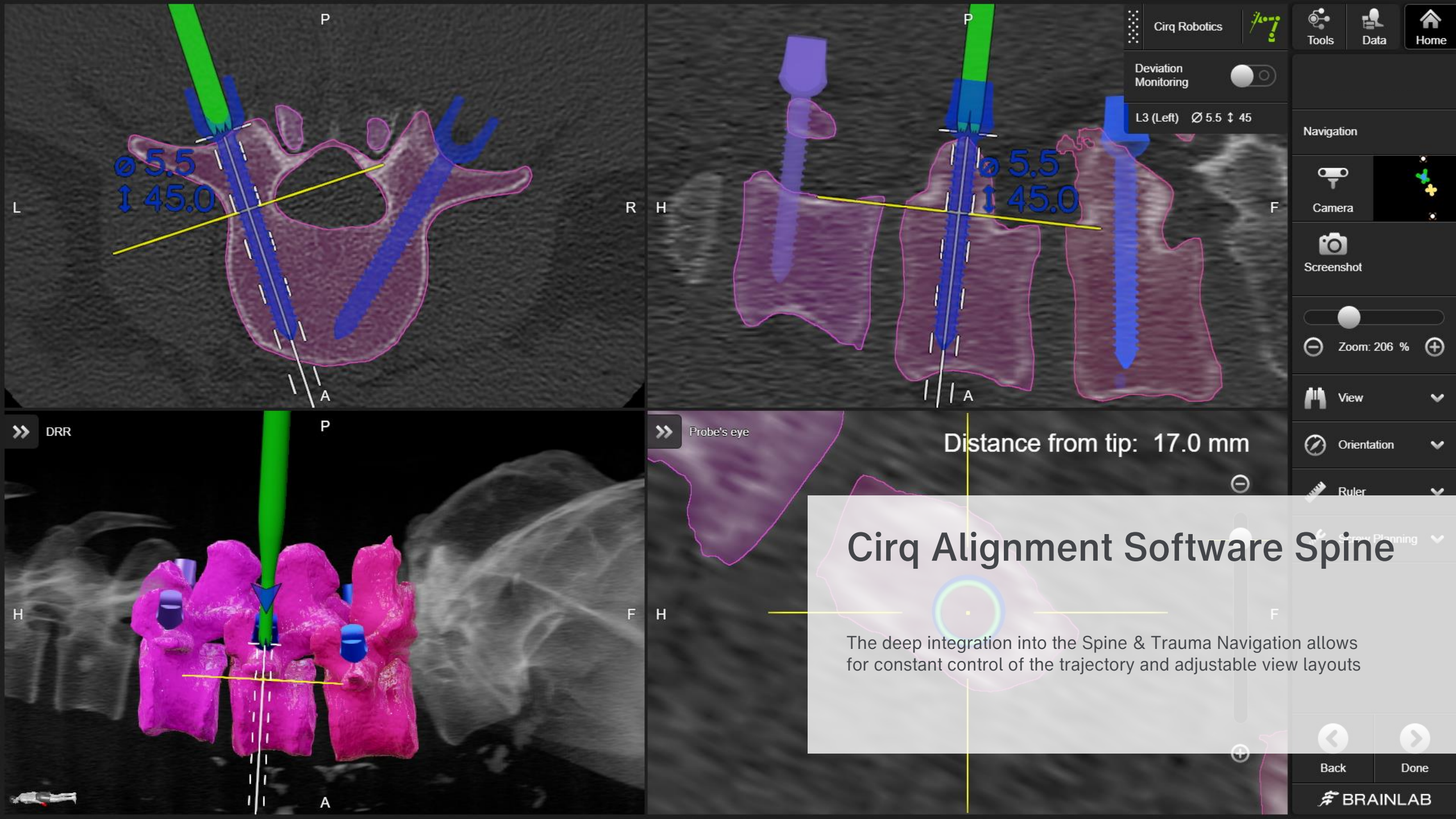
Spine

- Automatic alignment to planned screw trajectory after manual arm positioning
- Cirq Alignment Software Spine provides visual guidance towards region of interest
- Real time tracking of instruments and adjustable deviation warning allows full control during drilling
- Drill guide teeth designed for forceless anchoring on the bone
- Drill guide length and diameters suitable for various patient anatomies
- Four-marker patient and instrument arrays ensure robust tracking
- Seamless navigated workflow



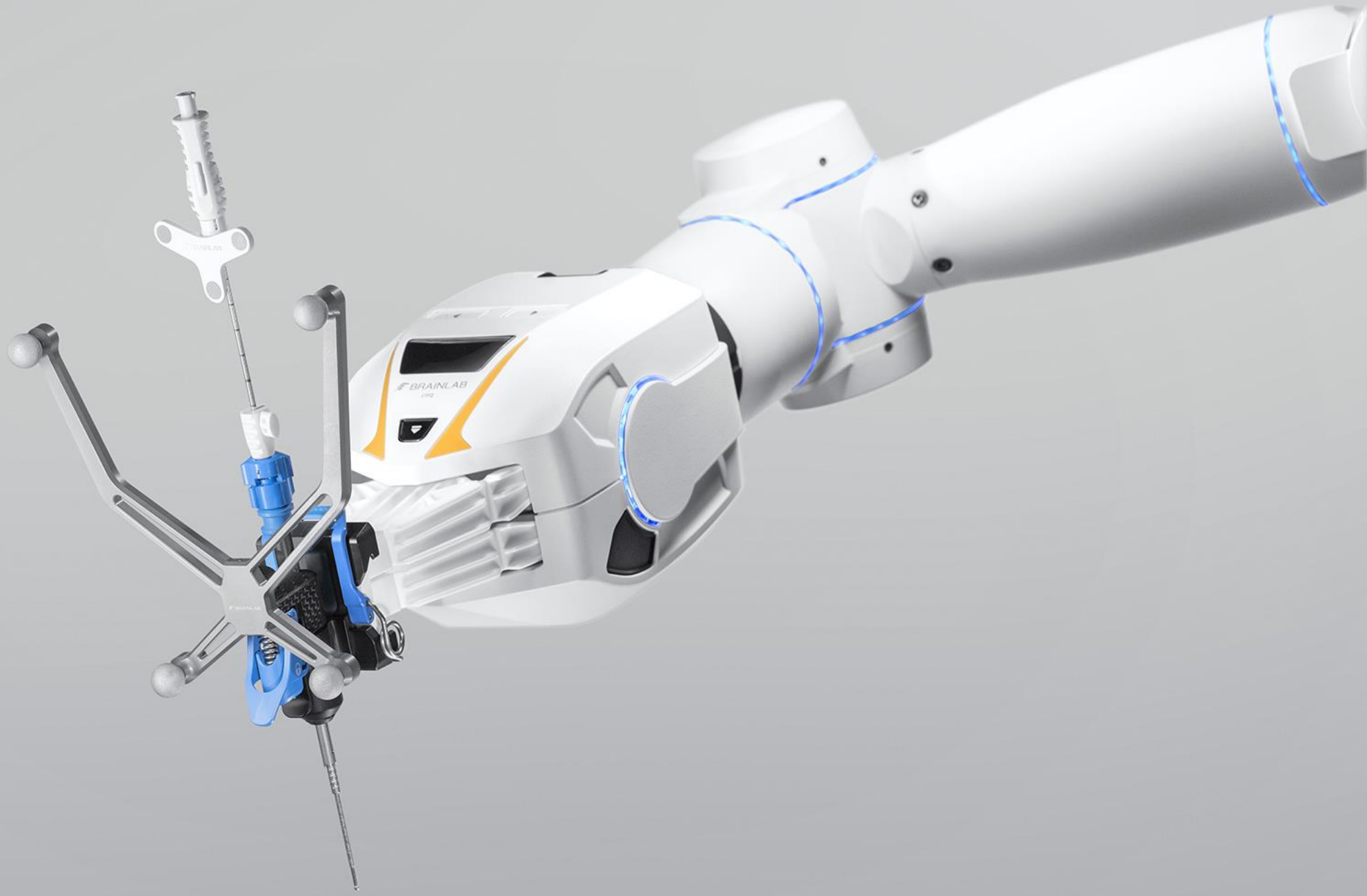
Cirq Alignment Software Spine

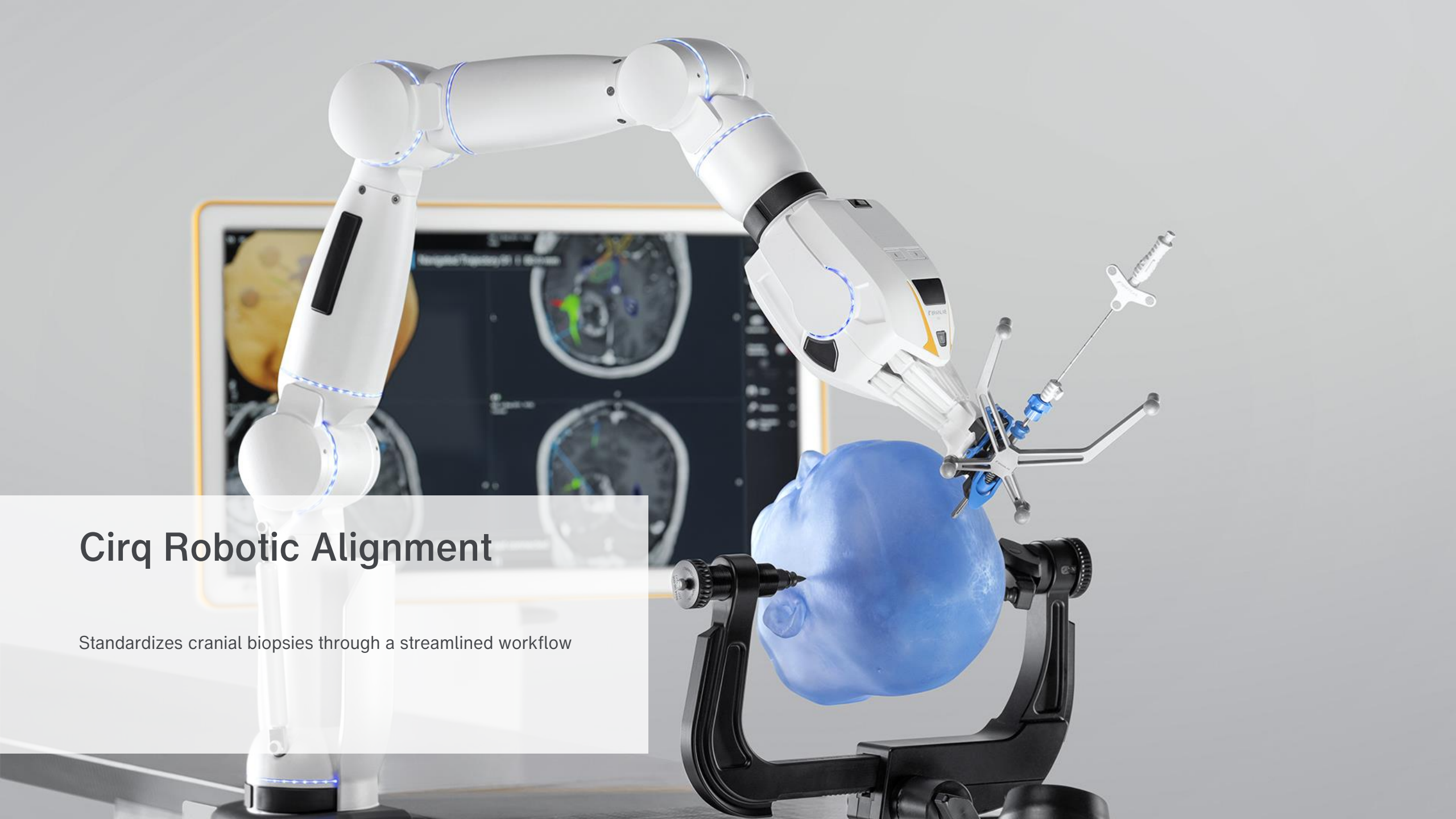
Intuitive assistance for the rough alignment guides towards the screw trajectory when Cirq Arm System is unlocked


P
L
R
A
⌀5.5
↕45.0
P
H
F
A
⌀5.5
↕45.0
Cirq Robotics
Deviation Monitoring
L3 (Left) ⌀5.5 ↕45
Tools
Data
Home
Navigation
Camera
Screenshot
Zoom: 206 %
View
Orientation
Ruler
DRR
P
H
F
A
Probe's eye
Distance from tip: 17.0 mm
H
F
Cirq Alignment Software Spine
The deep integration into the Spine & Trauma Navigation allows for constant control of the trajectory and adjustable view layouts
Back
Done
BRAINLAB

02.

Cranial





Cirq Robotic Alignment

Standardizes cranial biopsies through a streamlined workflow

Instrumentation

Standardizing cranial biopsies

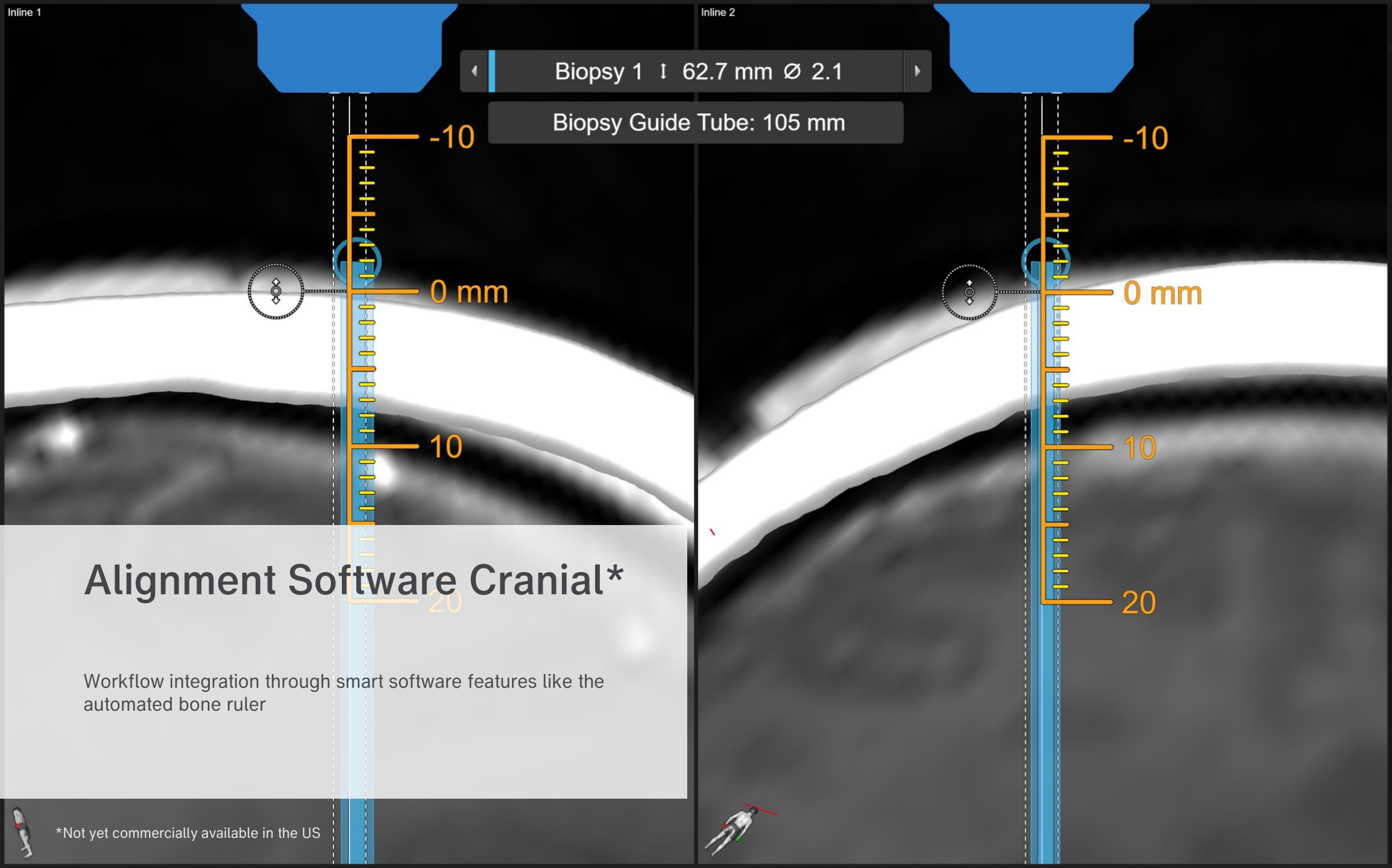
- **Alignment guide tube**
  - Large integrated flushing windows
  - 3.8mm diameter for minimally invasive access
  - Sharp teeth for a stable connection to the patient’s skull
  - Small incision size for minimally invasive access
  - Sharp teeth lock entry point during drilling
- **Bone anchor**
  - Threaded tip fixates the instruments against the patient’s skull
  - Locking mechanism secures the position of the biopsy needle when taking a tissue sample
- **Disposable biopsy needle**
  - 3-flat marker reference geometry
  - Improved suction and high usability

Cirq Robotic Alignment Module

Cranial

- Automatic alignment to planned biopsy trajectory after manual arm positioning
- Cirq Alignment Software* provides visual guidance towards region of interest
- Adaptable software view layouts provide relevant information at the right time
- Dedicated 3.4mm drill guide helps keep incisions small
- Special biopsy bone anchor for the skull adds stability to the setup and locks biopsy needle in place
- Pre-calibrated biopsy needle with guide tube facilitates seamless performance

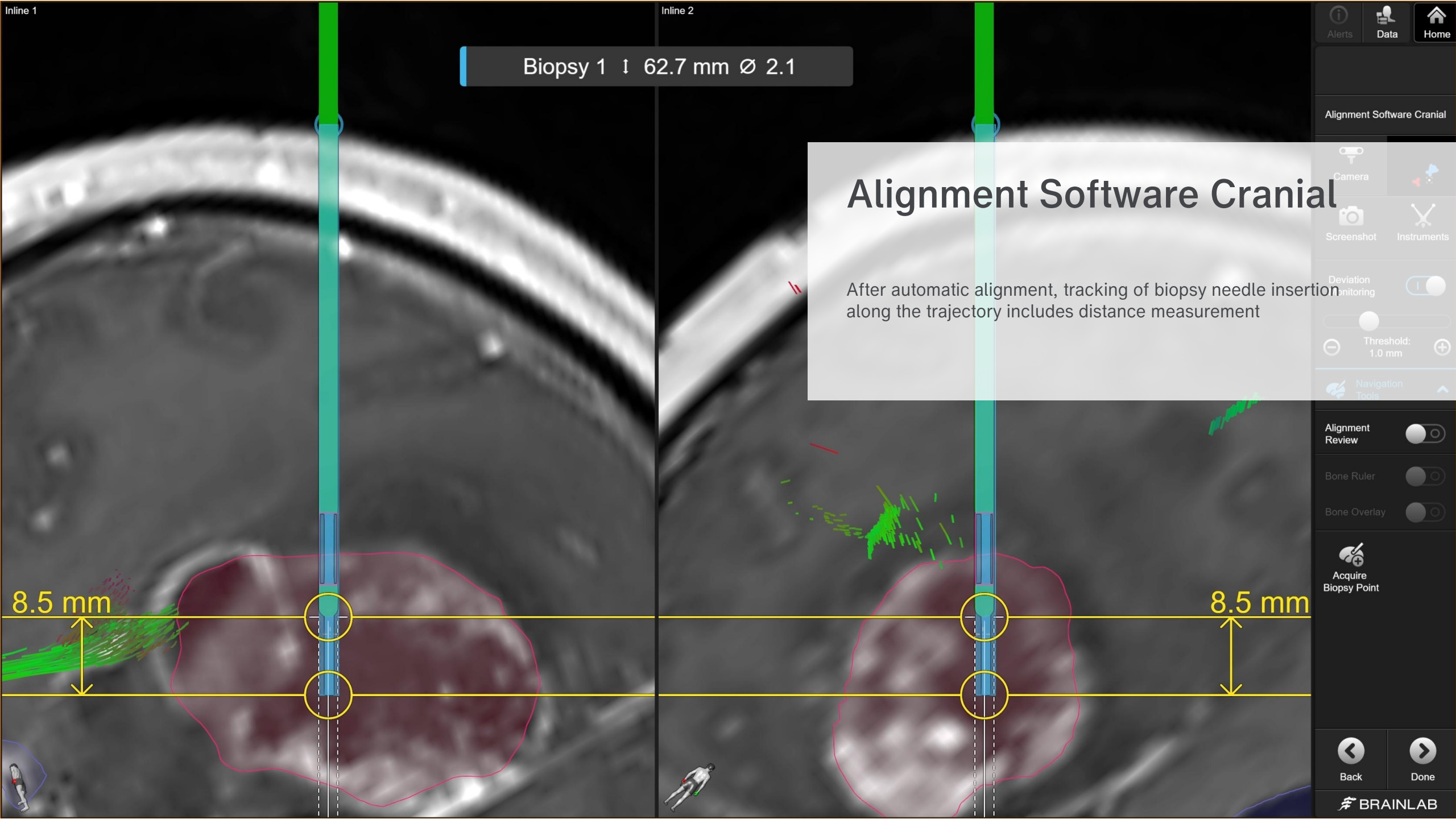
*Cirq Alignment Software Cranial and related instruments are not yet commercially available in the US



Alignment Software Cranial*

Workflow integration through smart software features like the automated bone ruler

*Not yet commercially available in the US

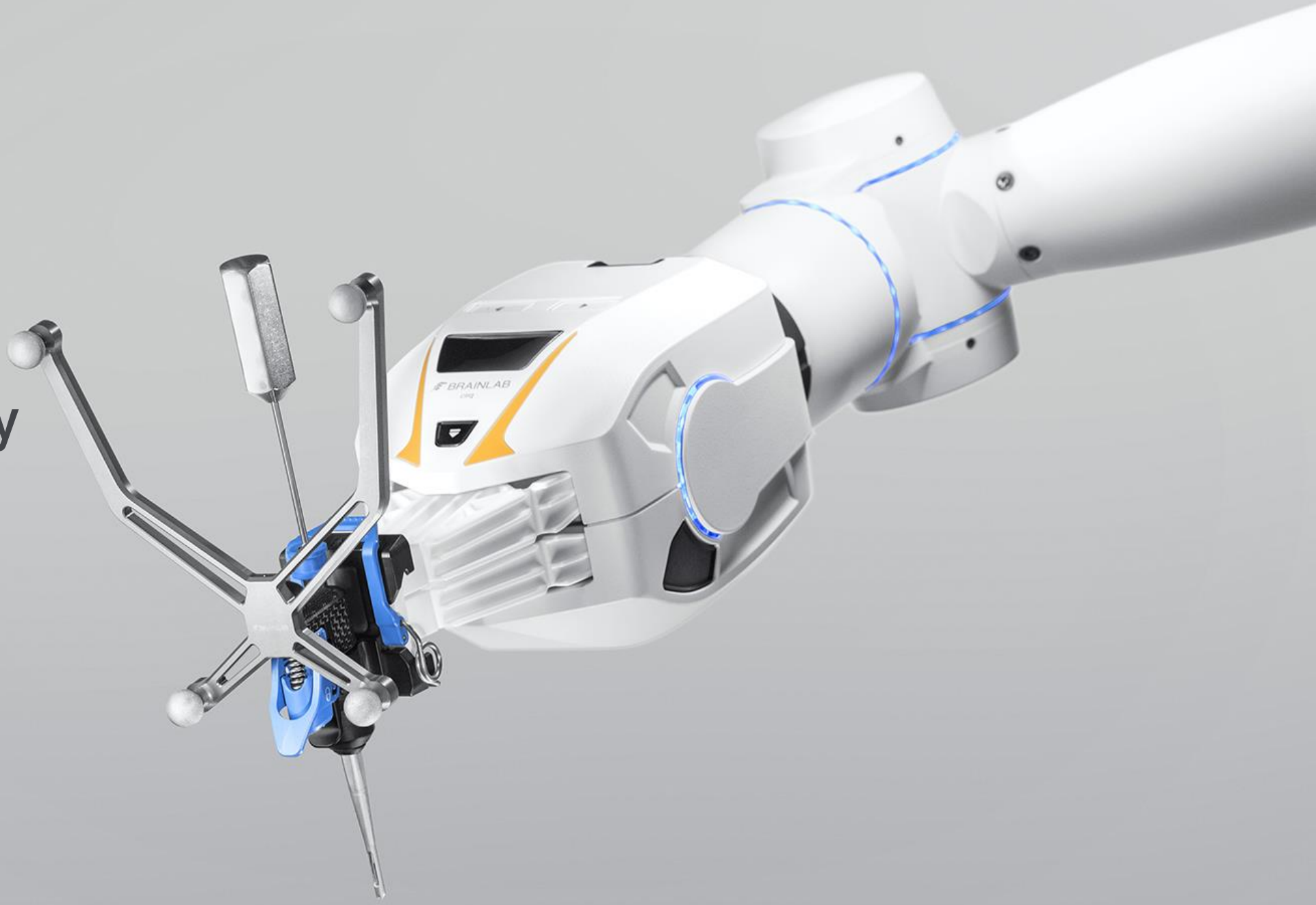


Alignment Software Cranial

After automatic alignment, tracking of biopsy needle insertion along the trajectory includes distance measurement

03.

Functional Stereotactic Neurosurgery



Cirq Robotic Alignment Module

Assists in stereotactic electrode placement* within a fully integrated workflow

*Cirq Alignment Software Cranial SEEG and related instruments are not yet commercially available in the US

Instrumentation

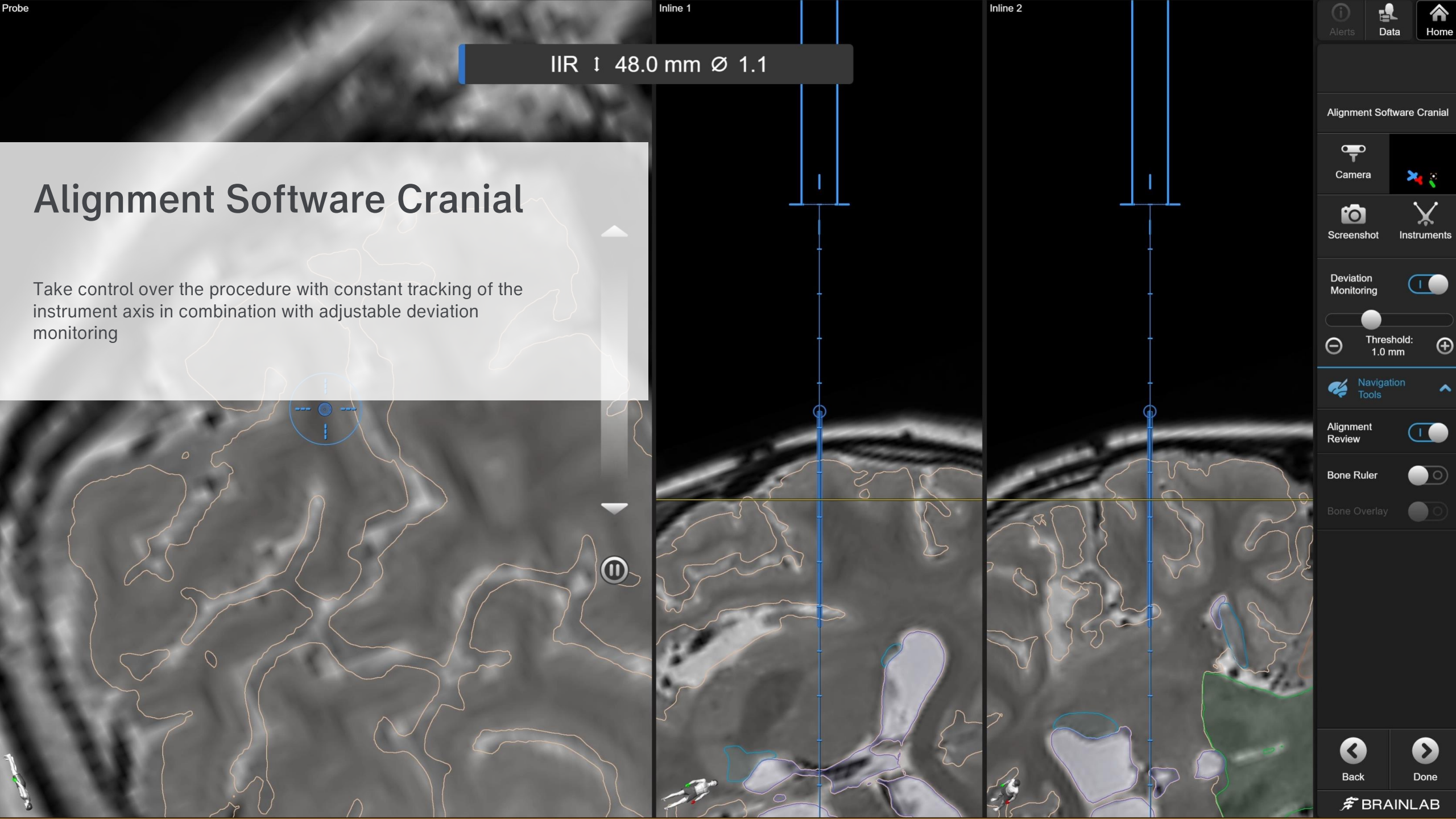
Facilitating frameless stereotactic procedures

- **Alignment guide tube**
  - Integrated flushing windows
  - Sharp teeth ensure a stable connection to the patient’s skull during drilling
  - Guides dedicated drills, bone anchors and screwdrivers
  - Small diameter for a minimally invasive approach
- **Drill bits with drill depth stops**
- Centering tip prevents skiving
- Balanced drill depth stop for smooth high-speed drilling

Cirq Robotic Alignment Module

Functional Stereotactic Neurosurgery

- Frameless stereotactic approach for less patient discomfort
- Automatic alignment to preplanned trajectories
- Deviation monitoring and Alignment Review allow full control of the accuracy throughout the procedure
- Optical navigation allows intraoperative measurements along the trajectory to set the length of the depth stop
- Integration into Brainlab ecosystem



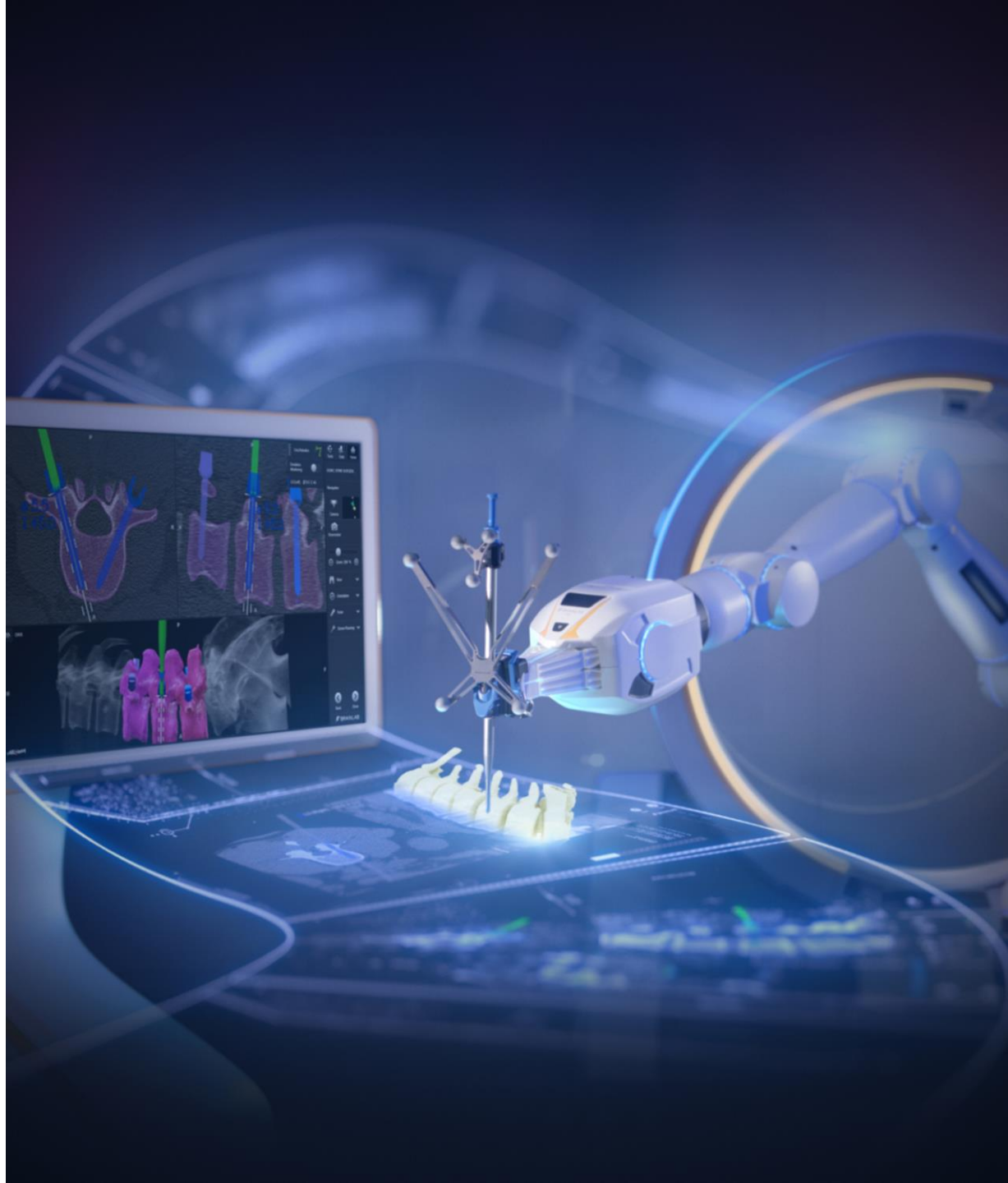
Alignment Software Cranial

Take control over the procedure with constant tracking of the instrument axis in combination with adjustable deviation monitoring

Robotic Suite

100% navigation integration

- Leverages established workflows, set-ups and instrumentation
- Compatible with Kick and Curve navigation platforms
- Ideal in combination with intraoperative imaging such as Loop-X, Airo or C-arms as Cirq remains at the OR table during scanning
- Features software for setup guidance and benefits from Elements software for detailed approach planning
- Future-proof modularity with building blocks for simple switch of modules



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