



# DESTINATION STARTUP®

## Double Helix Optics

**One-Sentence Summary of What You Do:** Double Helix Optics is designing and manufacturing sensors and imaging modules for precision 3D imaging used in life and material sciences, industrial inspection and machine vision to enable imaging and tracking of objects from single molecules inside cells (10-15 nm) to hand/face recognition with detailed 3D information utilizing patented light engineering technology.

**Affiliated Institution:** University of Colorado Boulder

**Have you formed a company yet?** Yes

**Funding/Financing:** Grant Funding, Angel Funding (including Self or Friends/Family), Other

**Please describe your company and the problem you are trying to solve:** To date microscopy products have been built around objectives designed for best performance at focus. Yet science is three-dimensional. For full information, depth and volume are required. With DHO's patented Light Engineering™ technology, we enable depth with precision in a small footprint, adaptable to a range of optical setups from microscopes to high content screening systems to industrial inspection, and machine vision. The first implementation of our high precision-extended depth technology is currently enabling new scientific discovery in a range of areas including immunology, virology, bacteriology, cancer, neuroscience, biomolecule development and beyond. With our technology scientists who have historically been limited in their ability to see and study cellular structures by the diffraction barrier of 200 nm, can now view objects with an order of magnitude improvement in precision - with clarity of down to 15-25 nanometer precision in 3D. We have packaged this groundbreaking technology into affordable modules - SPINDLE® - that can be attached to most scientific microscopes, converting them to 3D imaging systems. Our library of interchangeable phase masks enable optimized configuration to meet the specific imaging requirements of the customer - be s/he in life sciences, material sciences or performing object inspection. Our 3DTRAX® image reconstruction software offers patented algorithms optimized for use with our SPINDLE. Additionally, our technology has been adopted by OEM customers to upgrade their instruments from 2D to 3D. DHO has 10 issued patents, 4 in review and more in development. The Double Helix, SPINDLE and 3DTRAX names are trademarked.

**What is/was your go-to-market strategy?** We entered the market with a breakthrough 3D imaging tool for precision nanoscale imaging targeted to the life sciences market. The super-resolution imaging market is estimated to be \$4.2B by 2022 with 4 segments: life sciences, material sciences, nanotechnology and semiconductor. DHO focused initially on the life sciences market. Since introducing our SPINDLE in Q42017 we have expanded our product line to support additional life



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sciences market segments/applications including live cell imaging and high content screening. Additionally we have built proof of concept product for industrial inspection/3D metrology, and proof of principle demonstration for machine vision applications specifically gesture recognition. Each of these markets represents significant growth opportunity for DHO with efforts to extend product offerings from 2D to 3D with the best precision and depth information capture possible. The instrumentation segment of the high content screening market is estimated to be \$1.1B by 2023, growing at a CAGR of 12%. The 3D metrology market is estimated to be \$16.2B by 2024, growing at a CAGR of 9.3%. Access to these markets will primarily be through partnerships in which DHO's technology is integrated into our partners' systems. We are actively engaged in discussions with both life science and inspection companies for such integration in addition to the OEM partnership already established. DHO is unique in capturing 3D information a single shot without scanning and enabling the upgrade of 2D systems to 3D in a small footprint, adaptable to a range of optical setups.

**How will/do you generate revenue?** The company currently generates revenue through direct product and OEM sales. Our direct customers are primarily researchers in academia and industry looking to extend their research from 2D to 3D. Our SPINDLE® imaging modules are designed to offer an easy upgrade path to 3D imaging without the need to purchase a new microscope. Our modules cost 1/6-1/8th the price of a new microscope system and offer more than 6x the depth range of these more expensive options. Our SPINDLE modules include the customer's choice of our patented phase masks to match their optical setup and target object imaging requirements plus reconstruction software -3DTRAX®- optimized for use with our phase masks and module. Additional masks and software modules can be purchased at any time. We have a growing base of customers in the US, Europe and Asia. Over 50 peer reviewed articles have been published utilizing our technology in a range of applications and modalities. New product releases will support expansion into additional growth life science market segments as well as inspection and machine vision markets. OEM sales represent a key source of revenue growth. Revenue is generated through engineering services, phase mask sales and licensing of our image reconstruction software. Typically there is an initial development contract to support the customer in integrating the DHO technology into their imaging systems, followed by a contract for annual volume purchase of phase masks and software licenses. DHO recently secured its first OEM partnership with a international microscopy company headquartered in Japan.

**How will this showcase benefit your company or technology?** The showcase will extend the region's awareness of our company and technology, offer the opportunity to meet interested investors as well as strategic partners. We are currently raising a round to support product manufacturing and market growth. We are open to angel, venture or corporate capital based on best fit. We are also interested in identifying strategic partners who can utilize our technology in their product lines as part of our Double Helix Inside strategy. Additionally we are always interested in identifying regional supply chain partners.



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## **Who are the members of your team and why is this the right team to get the job done?**

We are a small but dedicated team of engineers, scientists and entrepreneurs.

- Leslie Kimerling, co-founder and CEO, brings over 25 years of leadership experience working for and with tech and health start ups from launch to high growth and excels at taking powerful concepts from idea to market.
- Dr. Rafael Piestun, co-founder and CTIO, is the inventor of the Double Helix technology and a world recognized expert in 3D and computational imaging.
- Dr. Anurag Agrawal, principal optical engineer, received his PhD at CU/Boulder under the guidance of Dr. Piestun. As such he brings depth of expertise and experience in the core technology that drives our product development.
- Scott Gaumer, Director of Life Sciences has over 20 years experience working with life science instrumentation companies, developing and bring product to market. He joined DHO from GE Healthcare 5 years ago.
- Dr. Anjul Loiacono, Senior Director of Sales and Marketing, has extensive experience in building product lines/product brands and developing OEM partnerships. Her expertise in biomedicine complements the engineering team's expertise and CEO Kimerling's business expertise.
- We work together to match our technology's capabilities with market needs and build product accordingly. We have strong partners for volume manufacture; we sell product both direct and through select distributors with the proper expertise to market/sell our products in markets outside the US. We have a top line advisory board of business, technology and scientific experts including Nobel Prize winner W.E. Moerner of Stanford University.