Optalysys Optical Processing Technology

*Turbo Charges Existing Desktop and HPC Systems*

- Means to calculate Fourier Transform and Linear Algebra Operations Optically
- Massively Parallel Calculations performed at the Speed of Light
- OFT Analogous to 2D FFT, but resolution may be scaled without affecting process time
- High Resolution, fast (eg 4Kx2K, resolution, >2kHz) Liquid Crystal Microdisplays (SLMs) enter Numerical Data and Focus the light Around the System
- Addresses fundamental limitations of high-end electronic processing:
  - Power Consumption
  - Speed
  - Resolution
  - Data Management
  - Disruptive Pricing
- 2 Main Application Areas:
  - Big Data Volume analysis (correlation)
  - Model generation (partial derivatives)
- Complimentary, Modular, Rugged, Reconfigurable, Scalable
- Based upon well established principles
- Standalone/Integrated Co-Processor: First Product end 2017
Main Areas of Development

GENESYS Project: Bioinformatics

• Will perform alignment searches to identify patterns in nucleotide and protein sequences
  - "Out of the box" searches including BLAST, BWA, Exonerate, Bowtie, Clustal, Muscle and others
  - Open interface for third party applications
  - Exact and similarity searches
  - One to One, One to Many, Many to One and Many to Many
• 95% energy savings and 20x faster processing than a single 32 core HPC node.
• 2 year collaboration ending 31st May 2017
• £800,000 UK Government funded project

ESCAPE Project: Energy-efficient Scalable Algorithms for Weather Prediction at Exascale

• To create next-generation weather forecasting on exascale computers
• Design for an exascale solution
• A proof of concept optical co-processor to a Nvidia GPU working within a CRAY system
• Major European consortium led by ECMWF
• 3 year project starting Oct 2015 involving our CFD expert and dedicated PhD student
• €4m grant from European Commission’s Horizon 2020 programme

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Optalysys are the only company with the proven technology and expertise to realise our vision and we are excited to be in partnership with them

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ECMWF is hugely supportive of this proposal. It is clearly an exciting novel technology path to more scalability
Roadmap

Today
- TRL4 Prototype
- Scaleable, lensless design without alignment issues

2 years
- GENESYS™ product launches for bioinformatics market
- Scaled up in pixel count & frame rate

2022
- 50k resolution device is capable of boosting performance to multi-exaFLOP speeds.

[Diagram showing logarithmic scale with points for 2015, 2017, 2018, 2020, 2022, and 2025, with arrows indicating growth from 320 GigaFLOPS in 2015 to 17,100 GigaFLOPS in 2022.]