SPIE Optics + Optoelectronics 2019

ALPA workshop WS101

"Applying Laser-driven Particle Acceleration: Using Distinctive Energetic Particle and Photon Sources"

Welcome and Introduction: Paul R. Bolton

ALPA Workshop Introduction: Revised Meeting with a Broader Scope

- **a stronger case with a broader scope** – a new phase that accommodates **all applications** of laser-driven sources and accelerator systems

- this inaugural event is a new workshop at SPIE that does not focus exclusively on nonmedical or medical applications

- in a comprehensive programme, we feature **all meaningful doable/feasible applications** - establishing a **more realistic view** that supports our dreams/ imagination

- ALPA seeks a **comprehensive and balanced assortment of application topics** where the nonmedical vs medical distinction at this time is less important than demonstrating the value, need and realistic potential for meaningfully applying laser-driven sources and accelerator systems (of energetic particles and photons)

- we expect all applications (including medical) to benefit from this broader view

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- during the initial phase (up to 2017) we featured a clear focus on one medical application, particle (mostly ion) radiotherapy of cancer. We especially thank Ken Ledingham for his persistent leadership as chair of these (mini) SPIE conferences ….

  (more to say on this history at the end of today)

- beamline design can be application-specific and it is appropriate that we **also highlight progress with research and development of beam optics and beam line design/architecture** of integrated laser-driven sources and accelerator systems

- broader scope can enhance success likelihood for establishing functional laser-driven systems (engineering, technological development, new science). This first ALPA Workshop presents 15 invited talks in six sessions: laser-driven sources and accelerator systems,
  material science, radiation biology and oncology,
  radiation chemistry, unique neutron sources,
  novel imaging applications
  (eg. for food security and PIXE uses in cultural heritage investigations)

ALPA Workshop Further Discussion: Revised Meeting with a Broader Scope

2019 "Applying Laser-driven Particle Acceleration: Using Distinctive Energetic Particle and Photon Sources"

the path to here was trailblazed and trodden by the stalwart leadership of Ken Ledingham … I acknowledge & thank Ken for his persistent energy getting us to this phase in our progress (I thank also our previous co-chairs and programme committee members who helped Ken for their important contributions)

2017 "Medical Applications of Laser-Generated Beams of Particles IV: Review of Progress and Strategies for the Future"

2015 "Medical Applications of Laser-Generated Beams of Particles III: Review of Progress and Strategies for the Future"

2013 "Medical Applications of Laser-Generated Beams of Particles II: Review of Progress Made in Recent Years"

2011 "Medical Applications of Laser-Generated Secondary Sources of Radiation and Particles"

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- it bodes well that this year's programme filled quickly and almost 'fell into place'

- variety of **practical successes** can help sustain advancement of technology and science for the longer term –enabling continued strategic step-wise progress toward more sophisticated/mature systems with 'holy grail' applications in mind
  (cancer therapy might be the best known example)

- **a 'thrust' for more realistic science and technology** with beam line R&D and associated applications can instigate and strengthen the basis for our dreams/imagination
  (this 'fan-out' to multiple applications can accelerate development of this field)

- innovative accelerator advancement is perhaps instinctive; nonetheless, we must **demonstrate decisively that the laser-driven case has something new and compelling to offer** (*opinion - the 'popularized' smaller-cheaper mantra is weak and can be misleading*); must emphasize laser-driven options that are well-suited/unique/distinct/essential for given applications – we proceed thus aided by this kind of standing meeting …

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- in the greater context of other regular meetings, the ALPA Workshop documents advancement of the laser-driven case: i.e. coordinating several workshop series with a managed 'hub' – https://www.alpa.physik.uni-muenchen.de/

Targetry: (laser target, development & metrology)	Targ1 (2013 Garching) Targ2 (2015 Paris) Targ3 (2017 Salamanca) Targ4 (2019 Milano) Targ5 (2021 Bucharest-ELI-NP)
Instrumentation: (all diagnostics & control)	Inst1 (2010 Abingdon) Inst2 (2012 Paris) Inst3 (2015 Garching) (… 2020 planning)
ALPA: (applications & beam line development)	ALPA1 (2015 Venice Symposium) ALPA2 (2019 SPIE-Prague) ALPA3 (2021 SPIE-Prague) ALPA4 (2023 SPIE-Prague) ……

(note: laser development and associated laser-plasma physics are well-covered by other existing meetings)

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Coordinated workshops can tangibly highlight and document laser-driven accelerator advancement in a healthy exchange environment:

- **an informational framework** to topically crystallize the multifaceted effort to develop integrated laser-driven sources and accelerator systems

- **facilitate connection** – a reference structure that affords convenient access to R&D and researchers in this field for coordinating development, collaborations, meetings …

- affords **ready assessment of progress and prospects** of the laser-driven case towards multiple applications; more directly evidences context, relevance and the state-of-the-art