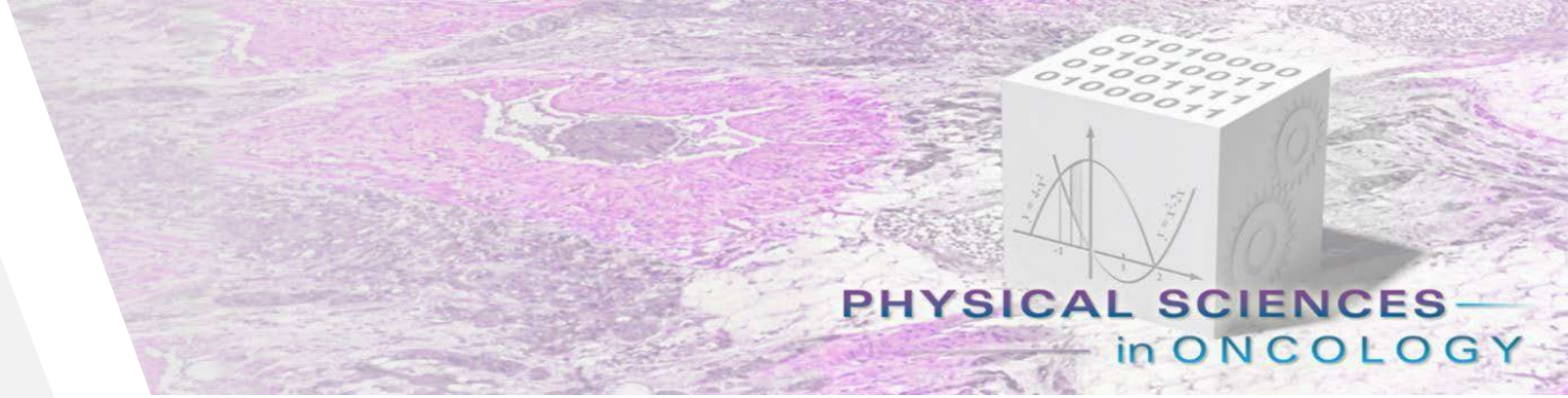
NCIPhySci
https://physics.cancer.gov



NCI Physical Sciences – Oncology Network Program Update

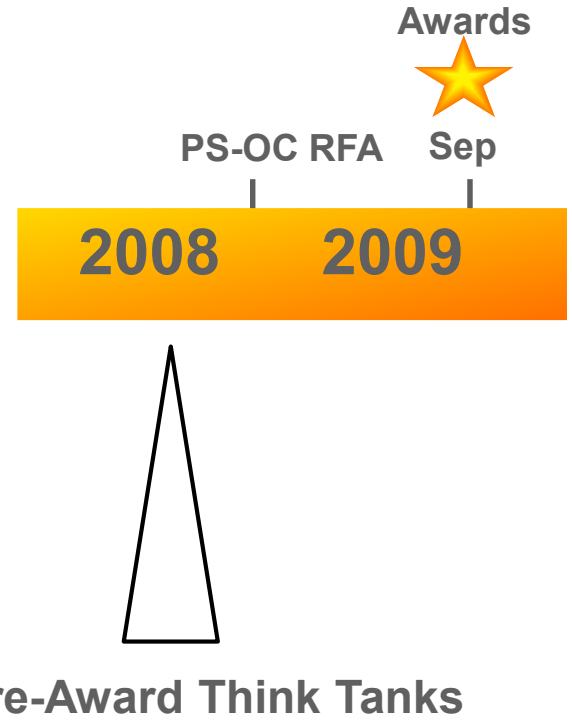
Nas Zahir, PhD (NCI Division of Cancer Biology)
Claudia Fischbach-Teschl, PhD (Cornell University)
Franziska Michor, PhD (Dana-Farber Cancer Institute)
Jann N. Sarkaria, MD (Mayo Clinic - Rochester)

12th Joint NCI BSA/NCAB Meeting
December 4, 2018

NIH NATIONAL CANCER INSTITUTE

NCI Physical Sciences-Oncology Initiative

Background



- Ten years ago, the NCI held a series of community-driven think tanks to explore the potential for bridging perspectives and approaches from the physical sciences, engineering and mathematics into cancer research.
- Programs existed to support technology development and cancer systems biology using computational approaches
- With the aid of extramural participants, the NCI began an initiative in 2009 to integrate nontraditional physical sciences approaches in cancer biology.

NCI Physical Sciences-Oncology Initiative

Overarching Goals and Scientific Research Areas

PHYSICAL SCIENCES— in ONCOLOGY

Goal: To foster transdisciplinary research and environments that ***integrate perspectives and approaches*** from the ***physical sciences*** with ***cancer research***.

Current scientific themes:

- ***Physical dynamics***

Physical properties such as ***mechanical cues, transport phenomena, bioelectric signals, and thermal fluctuations*** can modulate the behavior of cancer cells and the tumor microenvironment.

- ***Spatio-temporal organization***

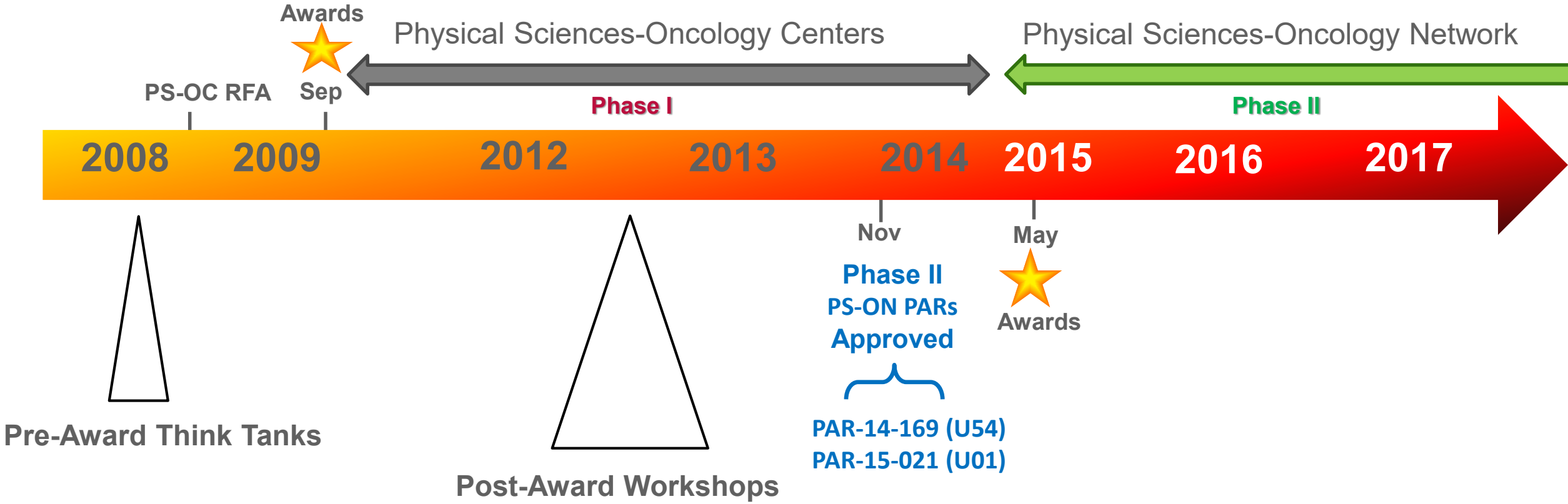
Appropriate spatial and temporal ***organization of structures across many biological and physical length-scales*** is required for managing the transfer of information that is critical for regulated growth.

- ***Evolutionary dynamics***

Cancer is a ***complex adaptive system*** that can be modeled using evolutionary theory to better understand, predict, and control disease progression.

NCI Physical Sciences-Oncology Initiative

Ongoing for 9 years



The program has been ongoing since 2009 when 12 Physical Sciences-Oncology Centers were funded. After a series of additional community-driven workshops, the program continued for a second phase in 2015 with both U54 research centers and U01 research projects.

Zahir. *Trends in Cancer,* 2018

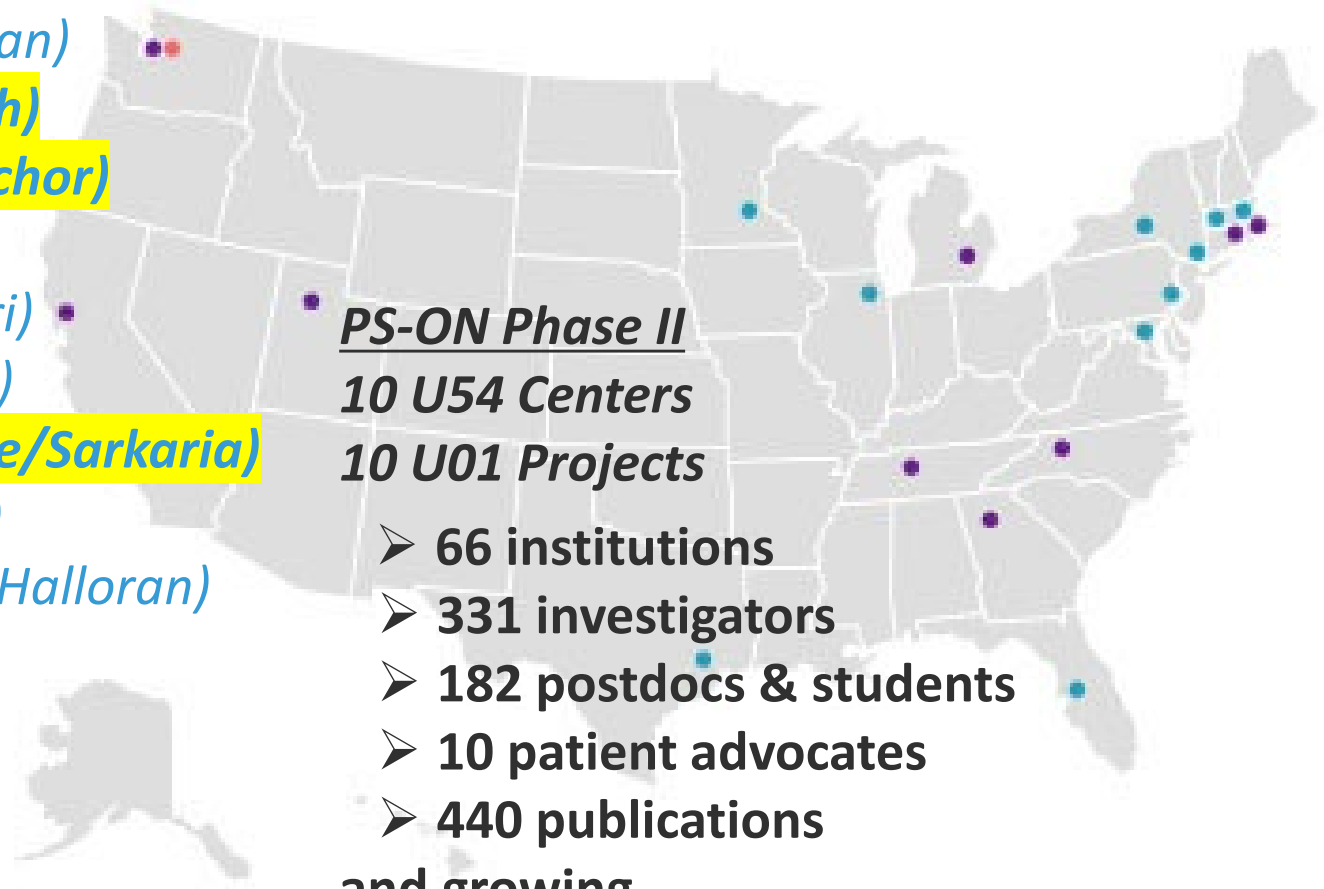
The Current NCI Physical Sciences – Oncology Network

PAR-14-169 (U54) / PAR-15-021 (U01)*

PHYSICAL SCIENCES— in ONCOLOGY

U54 Centers (PS-OC; hyperlink to Center website)

Columbia (Rabadan)
Cornell (Fischbach)
Dana-Farber (Michor)
Hopkins (Wirtz)
Methodist (Ferrari)
Minnesota (Odde)
MIT/Mayo (White/Sarkaria)
Moffitt (Gatenby)
Northwestern (O'Halloran)
Upenn (Discher)



PS-ON Phase II
10 U54 Centers
10 U01 Projects

- **66 institutions**
- **331 investigators**
- **182 postdocs & students**
- **10 patient advocates**
- **440 publications**

and growing . . .

U24 Coordinating Center

Sage Bionetworks (Guinney)

U01 Projects (PS-OP)

Berkeley (Groves)
Cal Tech (Heath)
Georgia Tech (Zhu)
Harvard (Fredberg)
Mass General (Toner)
Michigan (Luker)
MIT (Kamm)
Utah (Alter)
Vanderbilt (McCawley)
Wake Forest (Vidi)

**Details can be found at www.physics.cancer.gov and NOT-CA-19-005*

PS-ON Investigators Research Highlights

PHYSICAL SCIENCES— in ONCOLOGY

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