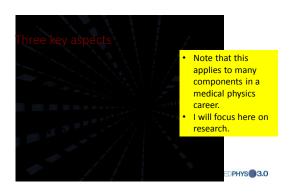
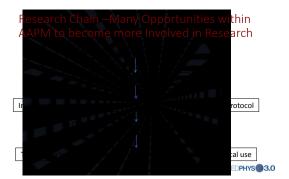
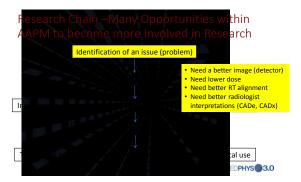
Key attributes of scientific excellence: rigor, innovation, and relevance	
Medical Physics 3.0  • Git	
Key Attributes of Scientific Excellence  Much of this talk was obtained from federal guidelines, e.g., from NIH and FDA.	













Research Chain – Many Opportunities within  AAPM to become more Invo New detector material for higher	
sensitivity  • New CT reconstruction	
Novel radiomics & deep learning for CADe or CADx New contouring algorithm for	
precision treatment  Investigation and potential solutions: equipment, algorithm, protocol	
investigation and potential solutions. Equipment, algorithm, protocol	
tal use	
cal use	
Research Chain – Many Opportunities within  AAPM to become more involved in Research	
Testing with phantoms     Statistical evaluation	
(bootstrapping) In Independent evaluation	
Validation of the research finding	
cal use	
EDPHYS 3.0	
Research Chain – Many Opportunities within	
AAPM to become more involved in Research	
rotocol	
FDA clinical study     Clinical testing with clinical	
Translation to clinical care: FDA clearance. clinical testing, clinical use	

Key Attributes of Scientific Excellence es, e.g.,	
Scientific Relevance: Significance and Premise  Scientific premise is NOT scientific significance  ionale? sts. barrier to  ed to fill c fields and  We do not do "homework problems" but address real problems	
Scientific Prem  Tre  Retrospective consideration of the foundation for the application rather than a prospective analysis should the aims be achieved.  Or research of the  gns	







Scientific Rigor  robust and unbiased  d I-controlled	
Biological Variables need to be included and addressed  • Critical factors that affect health or disease, such as sex, age, weight, and underlying health condition.  quently ing to an differences di	
Role of Medical Physics within state-of-the-art blomedical research  Clinician  Genomic Biologist imiliar to then x-rays were first iscovered.  Computer scientist  Statistician	

Medical Physicists as Research Leaders:	
Examples in Imaging and Radiation Therapy	
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EDPHYS 3.0	
Medical Physicists as Research Leaders:	
Examples in Imaging and Radiation Therapy ership	
lence	
*Example: deep learning with ultrasound images	
<ul> <li>Example: deep learning with ultrasound images</li> <li>Garbage in, garbage out</li> <li>Limits on data augmentation (physics of imaging)</li> </ul>	
<ul><li>Understanding of the potential clinical tasks</li><li>Collaboration with computer scientists</li></ul>	
EDPHYS 3.0	
Medical Physicists as Research Leaders: Examples in Imaging and Radiation Therapy	
ership lence	
<ul> <li>Example: Computer-based treatment planning</li> <li>Garbage in, garbage out</li> <li>Understanding of the limits of IMRT (physics of</li> </ul>	
RI)	
• Understanding of the potential clinical tasks	
EDPHYS 3.0	

