UNIVERSITY OF WASHINGTON MEDICAL CYCLOTRON FACILITY (UWMCF)

WORKSHOP ON APPLIED NUCLEAR DATA ACTIVITIES
WASHINGTON, D.C.

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JANUARY 22-24, 2019
• Multi-use facility
  • Fast neutron therapy (50.5 MeV protons incident on a beryllium target)
  • Proton research (medical applications, radiation effects testing)
  • Isotope production
• Available accelerated particles with UWMCF
  • Protons ($^1\text{H}^+$): 28.0 – 50.5 MeV (~70 μA extracted)
  • Protons ($^1\text{H}_2^+$): 7.0 – 12.0 MeV (~30 μA extracted)
  • Deuterons ($^2\text{H}^+$): 14.0 – 24.0 MeV (~30-40 μA extracted)
  • Helium-3 ($^3\text{He}^{++}$): 21.0 – 35.5 MeV (being developed)
  • Alphas ($^4\text{He}^{++}$): 27.0 – 47.3 MeV (~40-60 μA extracted)
• UWMCF isotope program is a recently stewarded facility of the USDOE-IP, part of the University Isotope Network (UIN)
• Helium-3 development currently a high priority for DOE
ISOTOPE PRODUCTION AT UWMCF

• Past: $^{11}$C, $^{13}$N, $^{15}$O, $^{18}$F
• Current: $^{57}$Ni, $^{72}$Se/$^{72}$As, $^{99m}$Tc, $^{117m}$Sn, $^{186}$Re, $^{190}$Ir, $^{205}$Bi, $^{211}$At, $^{236}$Np
• Future: $^{77}$Br, $^{167}$Tm, $^{226}$Th
• Multiple users in medical, industrial, and government applications
BEAMLINE LAYOUT

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PET Target Station Replaced with Experimental Station

$^{211}\text{At}, \ 2^{17}\text{mSn}$

$^{186}\text{Re}, \ 99\text{mTc}, \ 236\text{Np}$

2nd Treatment Room Converted to a Proton Research Room
50.5 MeV protons incident on a beryllium target
ISOCENTRIC GANTRY

WANDA, Washington, D.C., 2019
• UWMCF accelerates the following particles:
  - $^1\text{H}^+$, $^1\text{H}_2^+$, $^2\text{H}^+$, $^3\text{He}^{++}$, $^4\text{He}^{++}$
• On-site expertise in target design and isotope production
• Access to machine shop for custom target development
• Target modeling with MCNP6 and ANSYS
• High purity germanium detector for target analysis
• Radiochemistry group performs target processing
• Goal of developing accurate and efficient methods for production cross section measurements