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# High Power Laser Interactions Isotopes Separation Nuclear Fusion Control Elementary Particles Sele

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## **DILLON HARVEY**

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High power laser  
production of short-  
lived isotopes for ...

High Power Laser  
Interactions  
Isotopes Abstract.  
Recent experiments  
have demonstrated  
that laser-solid  
interactions at  
intensities greater than  
10 19 W/cm<sup>2</sup> can  
produce fast electron  
beams of several  
hundred MeV [1], tens  
of MeV  $\gamma$ -rays [2, 3], up  
to 58 MeV proton  
beams [4, 5], and  
heavier ions [6] of up  
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of the potential  
applications of the  
high-energy proton

beams is the  
production of  
radioactive isotopes for  
... High-Power Laser  
Production of PET  
Isotopes |  
SpringerLink Recent  
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positron ... High-power  
laser production of PET  
isotopes -  
Strathprints High power  
laser production of  
short-lived isotopes for

positron emission tomography K W D Ledingham 1,7 , P McKenna 1 , T McCanny 1 , S Shimizu 1,8 , J M Yang 1,9 , L Robson 1 , J Zweit 2,10 , J M Gillies 2 , J Bailey 2 , G N Chimon 2,10 , R J Clarke 3 , D Neely 3 , P A Norreys 3 , J L Collier 3 , R P Singhal 4 , M S Wei 5 , S P D Mangles 5 , P Nilson 5 , K Krushelnick 5 and M Zepf 6High power laser production of short-lived isotopes for ...Request PDF | High-Power Laser Production of PET Isotopes | Recent experiments have demonstrated that laser-solid interactions at intensities greater than  $10^{19}$  W/cm<sup>2</sup> can producefast electron ...High-Power Laser Production of PET Isotopes | Request PDFRecent results

show that when an intense laser beam interacts with solid targets, megaelectronvolt (MeV) protons capable of producing PET isotopes are generated. This report describes how to generate intense PET sources of <sup>11</sup>C and <sup>18</sup>F using a petawatt laser beam.High power laser production of short-lived isotopes for ...Recent results show that when an intense laser beam interacts with solid targets, megaelectronvolt (MeV) protons capable of producing PET isotopes are generated. This report describes how to generate intense PET sources of <sup>11</sup> C and <sup>18</sup> F using a petawatt laser beam.High power laser production of short-lived isotopes for

...INSTITUTE OF  
 PHYSICS PUBLISHING  
 JOURNAL OF PHYSICS  
 D: APPLIED PHYSICS J.  
 Phys. D: Appl. Phys. 37  
 (2004) 2341–2345 PII:  
 S0022-3727(04)78492-  
 2 High power laser  
 production of short-  
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 positron emission  
 tomography K W D  
 Ledingham<sup>1,7</sup>, P  
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 Yang<sup>1,9</sup>, L Robson<sup>1</sup>, J  
 Zweit<sup>2,10</sup>, J M Gillies<sup>2</sup>,  
 J Bailey<sup>2</sup>, G N  
 Chimon<sup>2,10</sup>, R J  
 Clarke<sup>3</sup>, D Neely<sup>3</sup>, P A  
 ...High power laser  
 production of short-  
 lived isotopes for ...title  
 = "High power laser  
 production of short-  
 lived isotopes for  
 positron emission  
 tomography", abstract  
 = "Positron emission  
 tomography (PET) is a  
 powerful

diagnostic/imaging  
 technique requiring the  
 production of the short-  
 lived positron emitting  
 isotopes <sup>11</sup>C, <sup>13</sup>N, <sup>15</sup>O  
 and <sup>18</sup>F by proton  
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 cyclotrons.High power  
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 short-lived isotopes for  
 ...High-intensity lasers  
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 W, pulse lengths of  
 $\sim 10^{-12}$ – $10^{-14}$  s,  
 intensities of  $\sim 10^{14}$ – $10^{23}$   
 W/cm<sup>2</sup>, and  
 repetition rates  
 ranging from  $10^3$ – $10^6$   
 Hz with average  
 powers of  $>10$  W.  
 These lasers are used  
 in high-field physics  
 research and have  
 numerous potential  
 applications.High-  
 power, high-intensity  
 laser propagation and  
 interactionsHigh Power

Laser-Matter Interaction. Authors: Mulser, Peter, Bauer, Dieter Free Preview. Comprehensive review; Buy this book eBook 128,39 ... The extension of laser interaction to the relativistic electron acceleration as well as the physics of collisionless absorption are the subject of Chapter 7. High Power Laser-Matter Interaction | Peter Mulser | Springer Interest in laser isotope separation and laser induced chemistry is now creating a large demand for tunable lasers throughout the frequency spectrum. In the visible and near uv these demands have generally been met with tunable dye lasers and frequency doubled dye lasers. High Power

Lasers For Isotope Separation The atomic vapor laser isotope separation (AVLIS) method, shown conceptually in Fig. 6, produces uranium vapor, injects laser energy at the precise frequency to ionize only the  $^{235}\text{U}$  atoms, and separates the  $^{235}\text{U}$  ions from the  $^{238}\text{U}$  atoms with an electromagnetic field. Research and development efforts on this method are top priority in the United States and of great interest in France, Japan ... Laser Isotope Separation - an overview | ScienceDirect Topics The huge progress made in the laser driven ion acceleration had open the possibility of using ions generated in high power laser

interactions with solid targets for the production of medical isotopes. Indeed, lasers could provide several key features with respect to the traditional method where the target activation is produced by particle beams delivered by cyclotrons. On the potential of laser driven isotope generation at ELI ...Using the powerful VULCAN laser, Ledingham et al. present a proof-of-principle demonstration in which radioactive isotopes of carbon and fluorine are produced in sufficient abundance during the interaction between petawatt laser pulses and a solid target such as gold, aluminum, or mylar foils. Laser-Produced Radioactive

Isotopes | ScienceThe field of high-power laser-plasma interaction has grown in the last few decades, with applications ranging from laser-driven fusion and laser acceleration of charged particles to laser ablation of materials. This comprehensive text covers fundamental concepts including electromagnetics and electrostatic waves, ...High-Power Laser-Plasma Interaction by C. S. LiuRecent progress in laser technology, including chirped pulse amplification (CPA) and optical parametric CPA (OPCPA) has stimulated global interest in the development of high-peak-power lasers. 15 15. C. Danson, D.

Hillier, N. Hopps et al.,  
“ Petawatt class lasers  
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Power Laser Sci. Eng.  
3, e3  
(2015). Photonuclear  
production of medical  
isotopes  $^{62,64}\text{Cu}$  using  
...LASER AND PLASMA  
INTERACTION AT HIGH  
POWER LASER FLUX  
INTRODUCTION :  
Plasma is a quasi  
neutral gas of charged  
and neutral particles  
which exhibit collective  
behavior. In collective  
behavior, motion  
depends not only on  
local conditions but on  
the state of plasma in  
the remote regions as  
well. Plasma often  
behaves as if it has its  
own mind. LASER AND  
PLASMA INTERACTION  
AT HIGH POWER LASER  
FLUX In house built dye  
laser and mass-  
spectrometer confirms  
high isotope  
selectivity. • Measured

ratio ( $^6\text{Li} / ^7\text{Li} \approx$   
0.080) is found in close  
agreement with  
literature. Concentratio  
n of  $^6\text{Li}$  isotope get  
enhanced remarkably  
from 7.5 up to over  
72%. Measured  
photoionization cross-  
section are  $^6\text{Li}$  ( $15.5 \pm$   
 $2.1$  Mb),  $^7\text{Li}$  ( $18.6 \pm$   
 $2.4$  Mb) Laser assisted  
isotope separation of  
lithium by two-step  
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### **High-power, high-intensity laser propagation and interactions**

The huge progress made in the laser driven ion acceleration had open the possibility of using ions generated in high power laser interactions with solid targets for the production of medical isotopes. Indeed, lasers could provide several key features with respect to the

traditional method where the target activation is produced by particle ...

*Laser Isotope*

*Separation - an overview |*

*ScienceDirect Topics*

In house built dye laser and mass-

spectrometer confirms high isotope

selectivity. • Measured

ratio ( $^6\text{Li}/^7\text{Li} \approx$

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$2.4\text{ Mb}$ )

High-power laser

production of PET

isotopes - Strathprints

High power laser

production of short-

lived isotopes for

positron emission



tomography K W D  
Ledingham 1,7 , P  
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McCanny 1 , S Shimizu  
1,8 , J M Yang 1,9 , L  
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K Krushelnick 5 and M  
Zepf 6

Photonuclear  
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...

High Power Laser  
Interactions Isotopes

### **High Power Lasers For Isotope Separation**

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positron ...

High Power Laser-  
Matter Interaction.

Authors: Mulser, Peter,  
Bauer, Dieter Free  
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Comprehensive review;  
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128,39 ... The  
extension of laser  
interaction to the  
relativistic electron  
acceleration as well as  
the physics of  
collisionless absorption  
are the subject of  
Chapter 7.

High-Power Laser-  
Plasma Interaction by  
C. S. Liu

Request PDF | High-Power Laser Production of PET Isotopes | Recent experiments have demonstrated that laser-solid interactions at intensities greater than  $10^{19}$  W/cm<sup>2</sup> can produce fast electron ...

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*LASER AND PLASMA INTERACTION AT HIGH POWER LASER FLUX*

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Laser assisted isotope separation of lithium by two-step ...

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These lasers are used in high-field physics research and have numerous potential applications.

*High Power Laser-Matter Interaction | Peter Mulser | Springer*

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15. C. Danson, D. Hillier, N. Hopps et al., "Petawatt class lasers worldwide," High Power Laser Sci. Eng.

3, e3 (2015).

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High-Power Laser Production of PET Isotopes | Request PDF

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**High-Power Laser Production of PET Isotopes | SpringerLink**

INSTITUTE OF PHYSICS PUBLISHING JOURNAL OF PHYSICS D: APPLIED PHYSICS J. Phys. D: Appl. Phys. 37 (2004) 2341–2345 PII: S0022-3727(04)78492-2 High power laser production of short-lived isotopes for positron emission tomography K W D Ledingham<sup>1,7</sup>, P McKenna<sup>1</sup>, T McCanny<sup>1</sup>, S Shimizu<sup>1,8</sup>, J M Yang<sup>1,9</sup>, L Robson<sup>1</sup>, J Zweit<sup>2,10</sup>, J M Gillies<sup>2</sup>, J Bailey<sup>2</sup>, G N Chimon<sup>2,10</sup>, R J Clarke<sup>3</sup>, D Neely<sup>3</sup>, P A

...

*High power laser production of short-lived isotopes for ...*  
title = "High power laser production of short-lived isotopes for positron emission tomography", abstract = "Positron emission tomography (PET) is a powerful diagnostic/imaging technique requiring the production of the short-lived positron emitting isotopes  $^{11}\text{C}$ ,  $^{13}\text{N}$ ,  $^{15}\text{O}$  and  $^{18}\text{F}$  by proton irradiation of natural/enriched targets using cyclotrons.

*High power laser production of short-lived isotopes for ...*  
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*Laser-Produced Radioactive Isotopes | Science*  
Abstract. Recent experiments have demonstrated that laser-solid interactions at intensities greater than  $10^{19} \text{ W/cm}^2$  can produce fast electron beams of several hundred MeV [1], tens of MeV  $\gamma$ -rays [2, 3], up to 58 MeV proton beams [4, 5], and heavier ions [6] of up to 7 MeV/nucleon. One of the potential applications of the high-energy proton beams is the production of radioactive isotopes for ...