Phys. Rev. A 51, 3053–3057 (1995)

Autoionizing states of the ytterbium atom by three-photon polarization spectroscopy

Jong–hoon Yi and Jongmin Lee
Korea Atomic Energy Research Institute, P.O. Box 105, Yusong, Taejon 305-600, Korea
Hong Jin Kong
Department of Physics, Korea Advanced Institute of Science and Technology, Taejon 305-701, Korea
Received 29 November 1994

The autoionizing states of ytterbium (Yb) were investigated by three-photon polarization spectroscopy. Ytterbium atoms were excited to autoionizing states through the transition $6s^2\ ^1S_0$–$6s6p\ ^3P_1$–$4f^{13}(^2F_{7/2})6s^26p_{3/2}$ (J=2). The total angular momenta J of the autoionizing states were identified by comparing the line intensities from the spectra recorded with different combinations of the laser polarization. In this work, 17 autoionizing states including many new ones were investigated. For all these states Fano parameters and J values are measured.

Phys. Rev. A 52, 382–386 (1995)

Effective excitation method of a three-level medium in a selective photoionization

A. S. Choe, Yongjoo Rhee, Jongmin Lee, and Pil Soon Han
Atomic Spectroscopy Laboratory, Korea Atomic Energy Research Institute, P.O. Box 105, Yusong, Taejon 305-600, Korea
S. K. Borisov, M. A. Kuzmina, and V. A. Mishin
General Physics Institute, 38 Valilov Street, 117942 Moscow, Russia
Received 16 December 1994

A principle for the efficient excitation of a three-level medium in a selective photoionization method is examined. It is shown that with special detunings for a given set of the laser-atom interaction the third-level population can be maximized. The expression of the optimal detunings is derived near the two-photon resonance region. It is shown that if the optimal detuning method is applied to three-level systems of Yb and Ca, the first-level populations are inverted to their corresponding third levels by about 100% and 86%, respectively. Application of this method to a Doppler-broadened medium is discussed and it is found that the optimal detuning method with counterpropagating waves will be very effective for selective ionization of wanted atoms.

Phys. Rev. A 53, 1751–1755 (1996)

Selective photoionization of the ytterbium atom by coherent two-photon excitation

Hyunmin Park and Jongmin Lee
Laboratory for Quantum Optics, Korea Atomic Energy Research Institute, P.O. Box 105, Yusong, Taejon 305-600, Korea
Jai–Hyung Lee and Joon–Sung Chang
Department of Physics, Seoul National University, Seoul 151-742, Korea
Received 31 July 1995

Highly selective photoionization of the ytterbium atom by coherent two-photon excitation was demonstrated experimentally. The Yb atom was excited by two single-mode lasers and ionized by a time-delayed broadband laser. The isotope ratio of the ions was analyzed by a time-of-flight mass spectrometer. The ion yield and the selectivity were recorded as a function of detuning of the first exciting laser. The maximum of ion yield was observed when the laser was detuned from resonance. The selectivity of ^{168}Yb was increased higher than 20 000 when the laser was blue-detuned to the most efficient position. Also, numerical analysis was performed to explain the experimental results.

Phys. Rev. A 55, 3819–3825 (1997)

Geometrical representation of coherent-excitation methods using delayed and detuned lasers

J. B. Kim
Department of Physics Education, Korea National University of Education, Choong-Buk 363-791, Korea
J. Lee, A. S. Choe, and Y. Rhee
Laboratory for Quantum Optics, Korea Atomic Energy Research Institute, Taejon 305-600, Korea

A precessing vector model has been developed for the geometrical interpretation of the adiabatic following and the optimal detuning methods, which play a decisive role in coherent population transfer in a three-level system. In our model, the Bloch vector defined by a population inversion and two-photon coherence components precesses about the torque vector consisting of an effective Rabi frequency and detuning components. The Bloch vector traces out different routes depending on combinations of the time delay of two laser pulses and detunings from the resonant frequencies. For the extreme cases where the optimal detuning with zero delay and the optimal delay with zero detunings are taken, our vector model with analytical solutions is compared with numerical solutions.

Phys. Rev. A 59, 1404–1407 (1999)

Expanded concept of the adiabatic population transfer using dressed states

H. A. Kim, H. S. Moon, and J. B. Kim
Department of Physics Education, Korea National University of Education, Chung-Buk 363-791, Korea
A. S. Choe and J. Lee
Laboratory for Quantum Optics, Korea Atomic Energy Research Institute, Taejon 305-600, Korea
Received 10 August 1998

We investigate several configurations for complete population transfer on the basis of the dressed state picture in a three-level system. This picture allows us not only to confirm an atom staying in the only dark state all the time under the well-known stimulated Raman adiabatic passage but also to find the considerably different dynamics from the conventional adiabatic process in cases where the pulses are significantly overlapped or concurrent (optimal detuning method). We expand the concept of the adiabatic process in order to explain all these cases.

5th **Korea**-Russia International Symposium Science and Technology: Proceedings Korus 2001

Mathematical Modelling of Copper Vapor Laser

Research of the Process Laser-" based Isotope Separation

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
5 February 2004 (05.02.2004)

PCT

(10) International Publication Number
WO 2004/011129 A1

(51) International Patent Classification[7]: B01D 59/34

(21) International Application Number: PCT/KR2002/001749

(22) International Filing Date: 18 September 2002 (18.09.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2002/44828 30 July 2002 (30.07.2002) KR

(71) Applicants *(for all designated States except US)*: **KOREA ATOMIC ENERGY RESEARCH INSTITUTE** [KR/KR]; 150 Dukjin-dong, Yusung-gu, 305-353 Daejeon (KR). **KOREA HYDRO & NUCLEAR POWER CO., LTD.** [KR/KR]; 167 Samsung-dong, Kangnam-gu, 135-090 Seoul (KR).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **JEONG, Do-Young** [KR/KR]; 106-1006 Expo Apt., Jeonmin-dong, Yuseong-gu, 305-761 Daejeon (KR). **KO, Kwang-Hoon** [KR/KR]; 308-501 Cheongsol Apt., Songkang-dong, Yuseong-gu, 305-752 Daejeon (KR). **LIM, Gwon** [KR/KR]; 25-91 Sambu Apt., Taepyung 2-dong, Jung-gu, 301-774 Daejeon (KR). **KIM, Cheol-Jung** [KR/KR]; 101-1803 Hanbit Apt., Uheun-dong, Yuseong-gu, 305-755 Daejeon (KR).

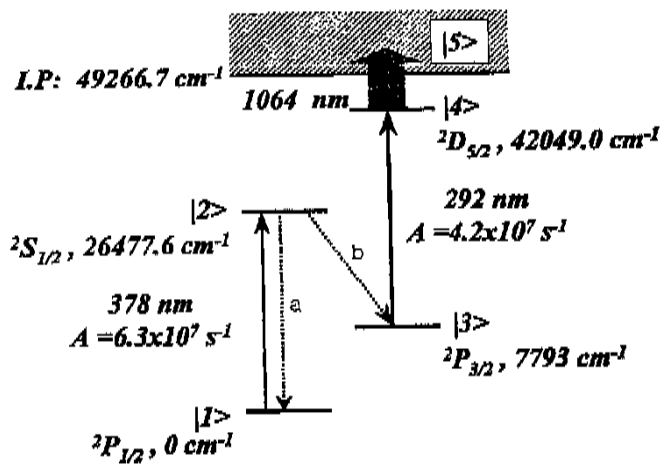
(74) Agent: **SON, Won**; C & S Patent and Law Office, C-2306 Daelim Acrotel, 467-6 Dogok-dong, Kangnam-gu, 135-971 Seoul (KR).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,

[Continued on next page]

(54) Title: METHOD FOR ISOTOPE SEPARATION OF THALLIUM



(57) Abstract: A method for isotope separation of thallium using laser beam is disclosed.The method comprises the steps of: (a) producing photons of a first frequency by a laser system, wherein said first frequency is about 378 nm; (b) producing photons of a second frequency by said laser system, wherein said second frequency is about 292 nm; (c) producing photons of a third frequency by said laser system, wherein said third frequency is in the range of 700 nm to 1400 nm; (d) applying said photons of said first, second and third frequencies to said vapor of said thallium, wherein said photons of said first frequency pump isotope-selectively a plurality of ground state thallium atoms through an excited state into a metastable state, and wherein said photons of said second frequency excite a plurality of metastable state thallium atoms to an intermediate, resonant state, and wherein said photons of said third frequency ionize a plurality of atoms in said intermediate, resonant state through continuum states; and (e) collecting said isotope ions. Thallium isotope can efficiently be separated with small scale facilities.

WO 2004/011129 A1

TUNABLE LASER STABILIZING SYSTEM

Patent number: KR128527
Publication date: 1998-04-07
Inventor: JUNG DO-YOUNG (KR); LEE JONG-MIN (KR); LEE YONG-JOO (KR)
Applicant: KOREA ATOMIC ENERGY RES (KR)
Classification:
- international: H01S3/137
- european:
Application number: KR19940005617 19940321
Priority number(s): KR19940005617 19940321

Abstract not available for KR128527

TUNABLE LASER STABILIZING SYSTEM AND DETECTOR

Patent number: KR128526
Publication date: 1998-04-07
Inventor: JUNG DO-YOUNG (KR); CHA HYUNG-KI (KR); LEE JONG-MIN (KR)
Applicant: KOREA ATOMIC ENERGY RES (JP)
Classification:
- international: H01S3/137
- european:
Application number: KR19940005616 19940321
Priority number(s): KR19940005616 19940321

Abstract not available for KR128526

DIODE PUMPED SOLID STATE LASER SYSTEM AND OPTIMUM PUMPING METHOD

Patent number: KR2001093437

Publication date: 2001-10-29

Inventor: LEE SEONG MAN (KR); CHA BYEONG HEON (KR); KIM HYEON SU (KR); KIM SEON GUK (KR); LEE JONG MIN (KR); MUN HUI JONG (KR)

Applicant: KOREA ATOMIC ENERGY RES (KR); KOREA ELECTRIC POWER CORP (KR)

Classification:

- international: H01S5/02

- european:

Application number: KR20000016049 20000329

Priority number(s): KR20000016049 20000329

Abstract not available for KR2001093437

REAL-TIME FEEDBACK CONTROL METHOD OF DYE LASER WAVELENGTHS USING MASS COMPOSITION SIGNAL GENERATED FROM LASER ISOTOPE SEPARATION PROCESS

Patent number: KR2003041656

Publication date: 2003-05-27

Inventor: CHA HYEONG GI (KR); SONG GYU SEOK (KR); CHA BYEONG HEON (KR); KIM DEOK HYEON (KR); LIM GWON (KR)

Applicant: KOREA ATOMIC ENERGY RES (KR); KOREA HYDRO & NUCLEAR POWER CO (KR)

Classification:

- international: B01D59/34

- european:

Application number: KR20010072584 20011121

Priority number(s): KR20010072584 20011121

Abstract not available for KR2003041656

ISOTOPE SEPARATION DEVICE OF LANTHANUM OR ACTINIUM BY DIODE LASER

Patent number:	KR2003051485
Publication date:	2003-06-25
Inventor:	LEE JONG HUN (KR)
Applicant:	YEUNGNAM EDUCATIONAL FOUNDATIO (KR)
Classification:	
- international:	B01D59/34
- european:	
Application number:	KR20030032507 20030522
Priority number(s):	KR20030032507 20030522

Abstract not available for KR2003051485