



Mārcis Auziņš
fiziķis, pasniedzējs



Brīvajos brīžos

Ar Valsts eksāmenu komisijas 1979. gada
„19.” jūnijā lēmumu

piešķirta *Auzinam M. P.*
Sizina, pasniedzēja

kvalifikācija.

Valsts eksāmenu
komisijas priekšsēdētājs

Rektors

Sekretārs *M. S. L.*

Z. V.

Rīgā, 1979. gada „28.” jūnijā
(Pilsēta)

Reģistrācijas Nr.

355

**1974. gadā Mārcis Auziņš absolvēja Rīgas 49. vidusskolu
8., 9., 10., 11. klasēs – absolūtais Latvijas Republikas
Fizikas olimpiādes uzvarētājs, piedalījās PSRS olimpiādēs.**



No 1974. līdz 1979. gadam – studijas LVU

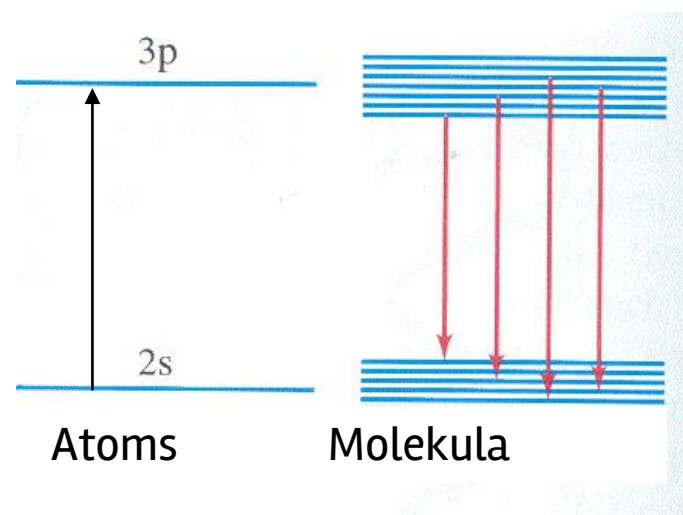
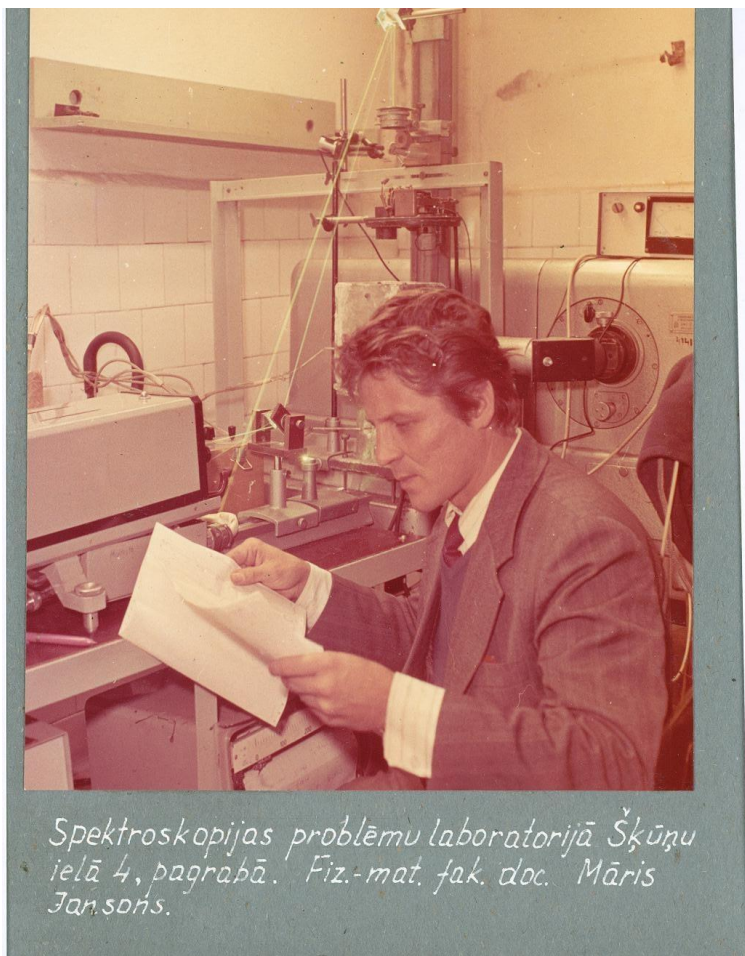
1976. gadā piedāvāts specializēties EDNVM katedrā, tomēr

Ojārs Šmits pierunāja pievērsties optikai un spektroskopijai, pielietojot lāzerus



Docents Ojārs Šmits,
LVU FMF Eksperimentālās fizikas katedras vadītājs

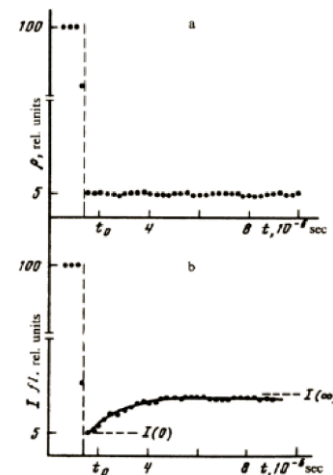
Kā viss sākās: 1970–tie gadi, lāzers un divatomu molekulas Rīgā top jauns virziens



Akadēmiķis M. Jansons (1936–1997)

Mārcis Auziņš ienāk grupā kā fiziķis - eksperimentātors

Jau diplomdarba 1979. g. tika iegūti rezultāti ar pasaulē atzītu novitāti: reālā laikā novērots, kā ar gaismu iztukšotas molekulas atgriežas līdzsvara stāvoklī. Diplomdarba rezultāts tiek publicēts tolaik prestižākajā PSRS žurnālā “Письма в ЖЭТФ”



M. P. Auzin'sh, I. Ya. Pirags, R. S. Ferber, and O. A. Shmit
P. Stuchki State University

**Direct measurement of thermalization rate of the ground
state of K_2 molecules**

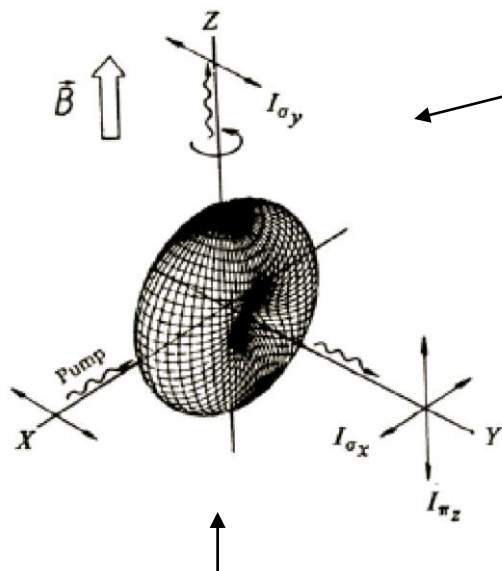
Pis'ma Zh. Eksp. Teor. Fiz. **31**, No. 10, 589–592 (20 May 1980)

Observation of quantum beats in the kinetics of the thermalization of diatomic molecules in the electronic ground state

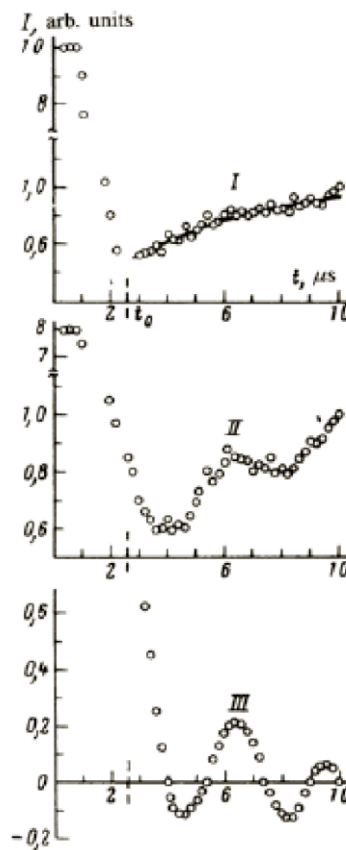
M. P. Auzin'sh, M. Ya. Tamanis, and R. S. Ferber
P. Stuchka Latvian State University

Pis'ma Zh. Eksp. Teor. Fiz. **42**, No. 4, 132–134 (25 August 1985)

Quantum magnetic beats have been discovered experimentally in the kinetics of the thermalization of a vibrational-rotational level of the ground state of diatomic molecules after emptying by a laser pulse.



Šī rotācija noved pie oscilācijām



Jauns efekts molekulās: brīvās kvantu oscilācijas magnētiskajā laukā

Mārcim Auziņam piemīt īpaša spēja izprast un uzskatāmi izskaidrot parādības būtību. Toreiz tas prasīja aptuveni gadu darba...

Mārcis Auziņš turpina apgūt teorētisko aprakstu, veic fizikālo parādību analīzi, novēro un apraksta jaunus ar koherenci saistītos efektus

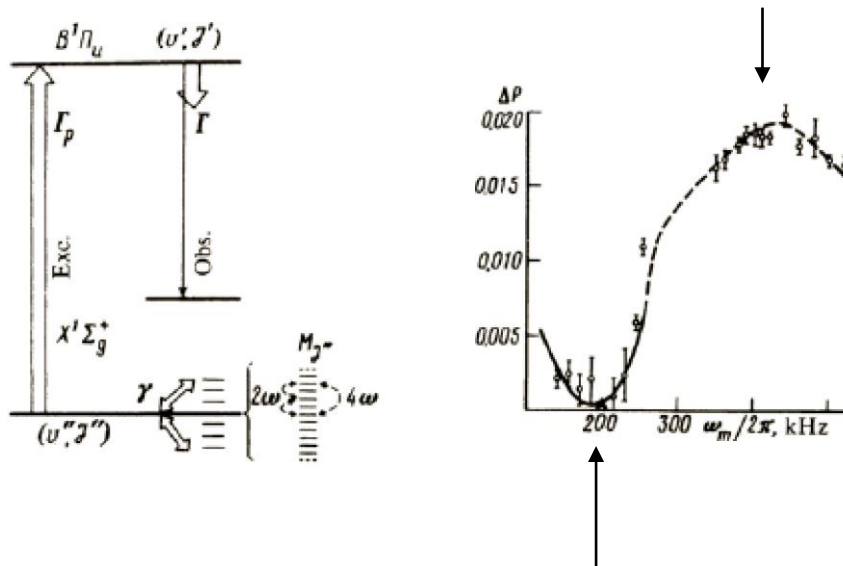
Observation of a quantum-beat resonance between magnetic sublevels with $\Delta M = 4$

M. P. Auzin'sh and R. S. Ferber

P. Stuchka Latvian State University, Riga

Pis'ma Zh. Eksp. Teor. Fiz. **39**, No. 8, 376–378 (5 April 1984)

polarization moments with $\kappa = 4$



Zināms, ka jābūt rezonansei uz frekvences 200 KHz, bet tas novērots arī uz dubultotās frekvences 400 KHz.

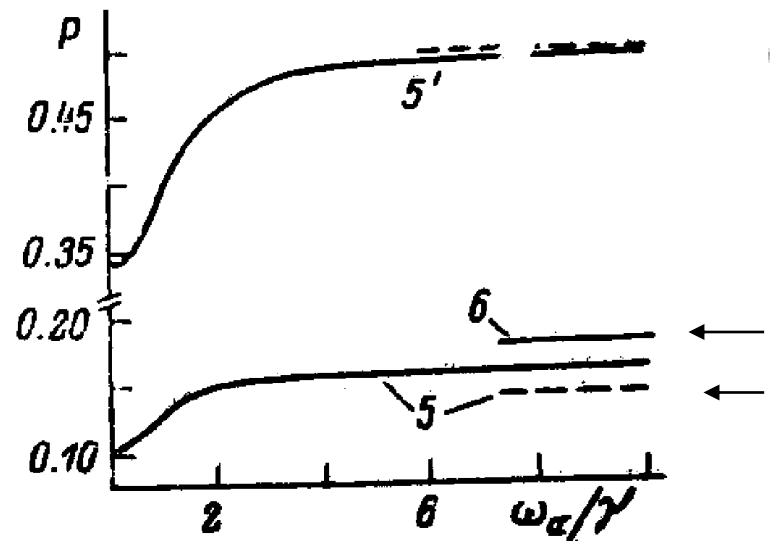
Tika novērots “heksadekapola” moments! Vēlreiz tas “atklāts” Bērklījas universitātē 2000. gadā.

$$P^{(2)} = \frac{0.5}{1 + 4 \Omega^2 / \Gamma^2} \left[1 - \frac{3\Gamma_{p0}(D_{22} - 8E_{22})}{14 - 3\Gamma_{p0}(2D_{20} + D_{22})} \right]$$

Vēl jauni efekti

Exceeding the classical limit of the degree of polarization

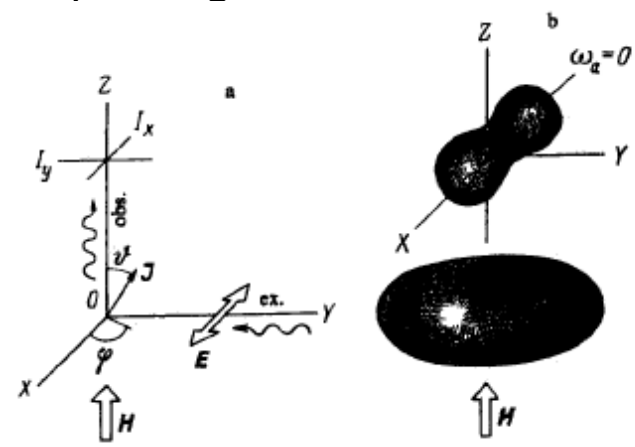
Opt. Spektrosk. 59, 11-16 (July 1985)



Tomēr iespējams pārsniegt!

Polarizācija 1/7 – absolūtais maksimums, kuru nevar pārsniegt.

$$P^{(P, R)} (\omega_a/\gamma \gg 1, \omega_b/\Gamma \ll 1) = \frac{7 - 10\eta^2/\eta_0^2 + 3\eta_0^2/\eta^2}{49 + 50\eta^2/\eta_0^2 + 6\eta_0^2/\eta^2} *$$



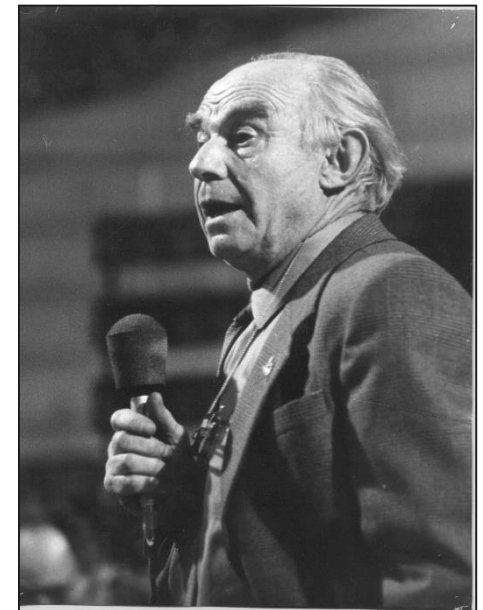
legūtie rezultāti 1986. gadā ļāva spīdoši aizstāvēt kandidāta disertāciju toreizējā Ļeņingradas Valsts universitātē.



Mārcis Auziņš kļūst par atraktīvu 30–gadīgu docentu.

Jau 1979. gadā, uzreiz pēc LVU FMF absolvēšanas, iesākts pasniedzēja darbs.

No Jāzepa Eidusa tika pārņemts Atomfizikas kurss, kurš tiek lasīts LU fiziķiem arī šodien – tagad dēvēts par Kvantu fiziku.



Profesors Jāzeps Eiduss

1990–1999: ceļš uz vispārinājumu: Sistēmas ar lielo rotācijas momentu J – klasiskais un kvantu apraksts; Gaismas un molekulu mijiedarbības izpratne

Nāk starptautiskā atzišana un atpazīstamība

Ap 30 rakstu, virkne publikāciju augsta „reitinga” žurnālos *Physical Review A.*, *Physical Review Letters* (viena no pirmajām zinātniskajām publikācijām Latvijā, kuras autori visi pārstāv mūsu valsti), arī pārskata raksti

VOLUME 69, NUMBER 24

PHYSICAL REVIEW LETTERS

14 DECEMBER 1992

J-Selective Stark Orientation of Molecular Rotation in a Beam

Marcis P. Auzinsh and Ruvin S. Ferber

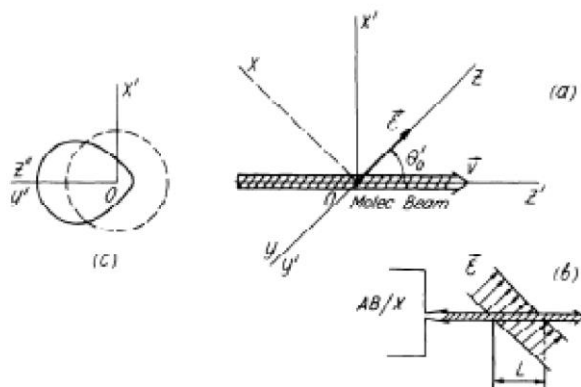


FIG. 1. Schematic of realization of alignment-orientation Stark conversion. (a) Choice of coordinate systems. (b) Possible realization scheme for AB molecules seeded in a free jet of X atoms. (c) Symbolic polar plot of J distribution.



Līdz šim zināms, ka molekulas rotācijas dēļ to leņķiskos momentus nevar orientēt vienā virzienā, pieliekot elektrisko lauku.
Parādīts, ka to tomēr var realizēt.

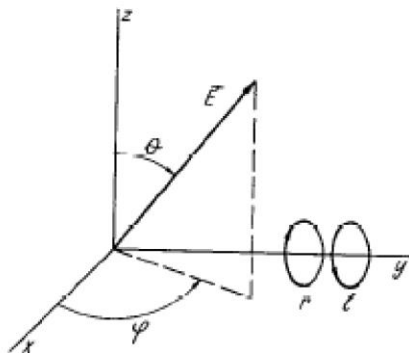
Jauni efekti, gaismai mijiedarboties ar molekulām

J. Chem. Phys., Vol. 99, No. 8, 15 October 1993

Emergence of circularity at linear polarized excitation of molecules

M. P. Auzinsh and R. S. Ferber

Department of Physics, University of Latvia, Riga LV-1586, Latvia



← Līdz šim bija zināms, ka, apstarojot molekulas ar lineāri polarizētu gaismu, nevar novērot cirkulāri polarizētu izstarošanu. Parādīts, ka tomēr var!

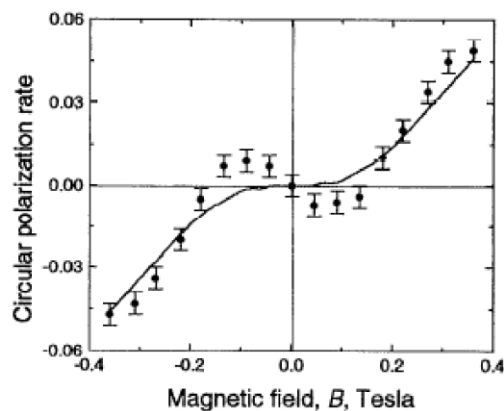
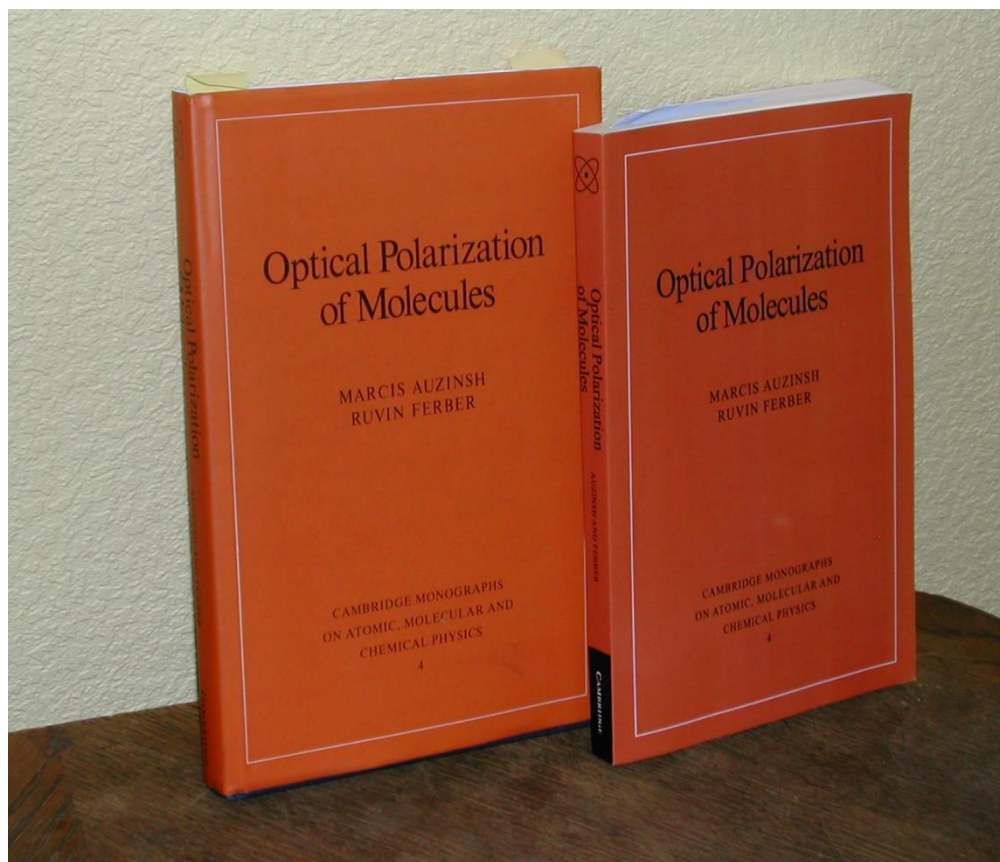


FIG. 5. Measured circularity signal for $v_1=2(J=96)$ level of $B^3\Sigma_u^-(1_u^-)$ state in $^{130}\text{Te}_2$. Full line is obtained by fitting according to Eq. (17).



**1992. gadā – Aleksandra fon Humbolta fonda balva
par sasniegumiem Hanle efekta pētījumos [Wilhelm Hanle (1901–93)]**



Marcis Auzinsh, Ruvin Ferber

“Optical Polarization of Molecules”

**Cambridge Monographs on Atomic, Molecular and Chemical Physics,
Cambridge University Press, 1995; 2005.**

Mārcis Auziņš – viesprofesors un viespētnieks dažādu valstu augstskolās un programmās



1996. gadā – Karaliskās biedrības viesprofesors
Saseksas Universitātē, Lielbritānijā

No 1996. līdz 1997. gadam – viespētnieks starptautiskā pētījumu
programmā „Orientētu molekulu mijiedarbība” Bīlefeldē, Vācijā



1998. gadā – viesprofesors Oklahomas Universitātē, ASV

Kā top Mārča Auziņa teorētiskais apraksts? Slavenie “Memo”

Memo

about HFS calculations in $D^1\Pi$ state of NaK

information collected by people in Moscow, Riga and Bielefeld
(put together by Marcis in Bielefeld)

1997

1 Introductory remark

Let me start with a statement that this is a rough superficially put together material. I shall be more than happy to obtain from people corrections, comments, additions and questions. The purpose of this memo is to start to collect together all the information we have obtained about HFS in $D^1\Pi$ state of NaK for collective use.

2 Introduction

The wave function for a rotating diatomic molecule in $^1\Pi$ state is

$$|JM^1\Pi_{e/f}\rangle = |JM^1\Pi_e\rangle = 2^{-1/2} [|JM\Lambda\rangle |\Lambda\rangle + \epsilon |JM - \Lambda\rangle |-\Lambda\rangle], \quad (1)$$

Tieksme un prasme visus sarežģītos efektus izskaidrot tēlaini – arī burtiskā nozīmē

Top didaktiskie raksti

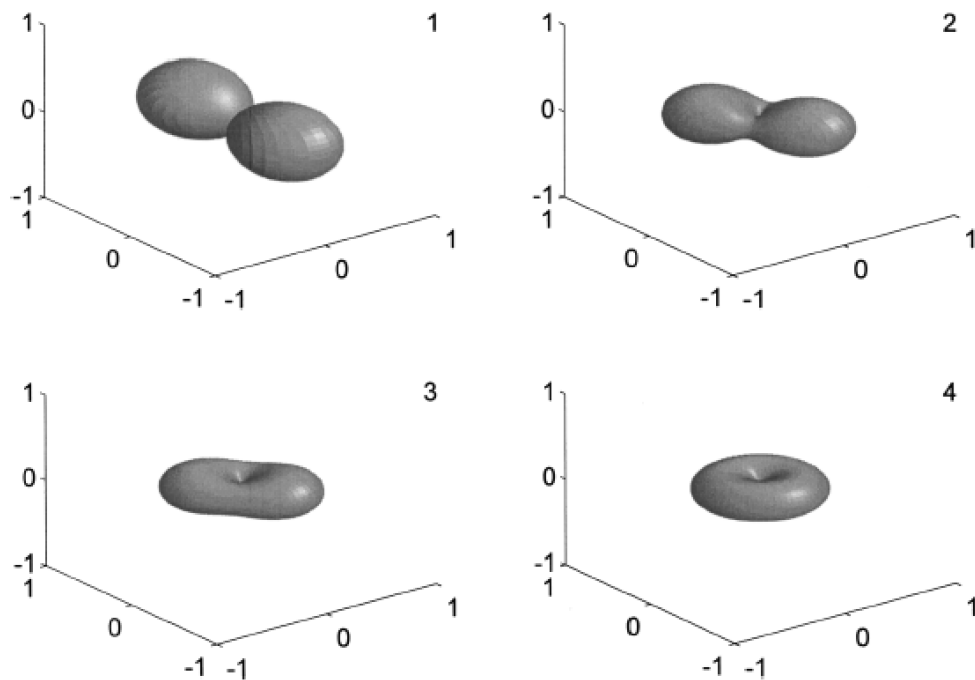
Tutorial/Article didactique

Angular momenta dynamics in magnetic and electric field: Classical and quantum approach

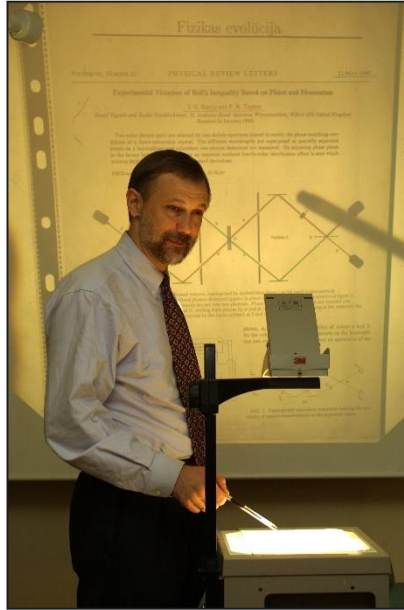
Marcis Auzinsh

Can. J. Phys. Vol. 75, 1997

Fig. 3. Ensemble of molecules excited by a continuous radiation in magnetic field; 1 – $\omega_B/\Gamma = 0$; 2 – $\omega_B/\Gamma = 1.0$; 3 – $\omega_B/\Gamma = 2.5$; 4 – $\omega_B/\Gamma = \infty$.



Sasniegumi un atzinība Latvijā



1994. gads – Eksperimentālās fizikas katedras vadītājs, LU FMF

1995. gads – Habilitētā doktora grāds fizikā,

1997. gads – LU profesors,

1998. gads – LZA īstenais loceklis

1998–2003 – LU Fizikas un matemātikas fakultātes

Atomfizikas un spektroskopijas institūta direktors

2000 – 2003: gaismas mijiedarbība ar atomiem

Jauns izaicinājums: vai iespējams izprast kaut ko būtiski jaunu?

Eksperimenti LU FMF ASI, attīstīta teorija

PHYSICAL REVIEW A, VOLUME 63, 023407

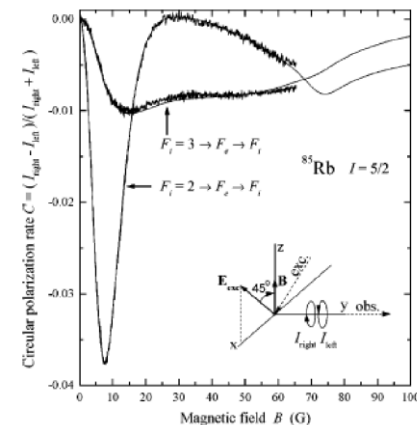
Angular-momentum spatial distribution symmetry breaking in Rb by an external magnetic field

Janis Alnis and Marcis Auzinsh*

Department of Physics, University of Latvia, 19 Rainis blvd., Riga LV-1586, Latvia

(Received 26 July 2000; published 16 January 2001)

Excited-state angular-momentum alignment–orientation conversion for atoms with hyperfine structure in the presence of an external magnetic field is investigated. Transversal orientation in these conditions is reported.



Simetrijas “laušana”

INSTITUTE OF PHYSICS PUBLISHING

JOURNAL OF PHYSICS B: ATOMIC, MOLECULAR AND OPTICAL PHYSICS

J. Phys. B: At. Mol. Opt. Phys. 34 (2001) 3889–3898

PII: S0953-4075(01)23132-0

Reverse dark resonance in Rb excited by a diode laser

Janis Alnis and Marcis Auzinsh

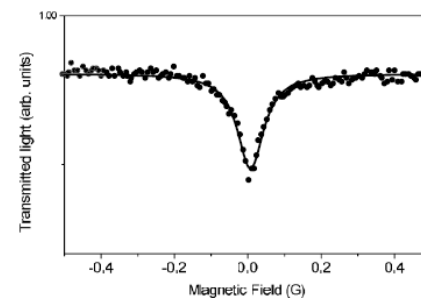


Figure 5. Measured (●) and simulated signal (full curve) for reverse dark resonance in ⁸⁵Rb.

Gaišās un tumšās rezonanses

The origin of recently discovered reverse (opposite-sign) dark resonances has been explained theoretically and verified experimentally. It is shown that the

Sasniegumi Latvijā paver ceļu uz sadarbību ar izciliem fiziķiem pasaules universitātēs



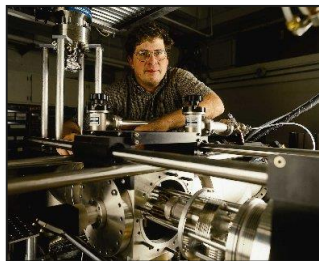
Prof. Dr. Klaas Bergmann, Technische Universität Kaiserslautern – LU goda doktors, viens no LU Lāzercentra pamatlicējiem

Kaufmann, O., A. Ekers, K. Bergmann, N. Bezuglov, K. Miculis, M. Auzinsh, and W. Meyer, *Velocity redistribution of excited atoms by radiative excitation transfer*. Journal of Chemical Physics, 2003



Prof. Evgenii E. Nikitin, Haifa Institute of Technology

Nikitin, E., E. Dashevskaya, J. Alnis, M. Auzinsh, E.R.I. Abraham, B.R. Furneaux, M. Keil, C. McRaven, N. Shafer-Ray, *Measurement and prediction of the speed-dependent throughput of a magnetic octupole velocity filter*, Physical Review A, 2003. **Vol. 68**



Neil Shafer-Ray, University of Oklahoma

Kendrick, B.K., L. Jayasinghe, S. Moser, M. Auzinsh, and N. Shafer-Ray, *Observation of predicted resonance structure in the $H+D_2 \rightarrow HD(v'=0, j'=7)+D$ reaction* Physical Review Letters, 2000. **84**



Pēc 2003. gada: jauni efekti, ceļš uz Bērkliju ASV, saglabājot piederību LU

Liktenīga tikšanās Somijā



Bērklijas universitātes profesors Dmitrijs
Budkers



Nozīmīgākie zinātnes sasniegumi 2004. gadā:

“Izmantojot kvantu efektus, paaugstināta magnetometrijas jutība virs klasiskās fizikas atļautās robežas”

(LU sadarbībā ar Kalifornijas universitāti, akadēmiķis M. Auziņš)

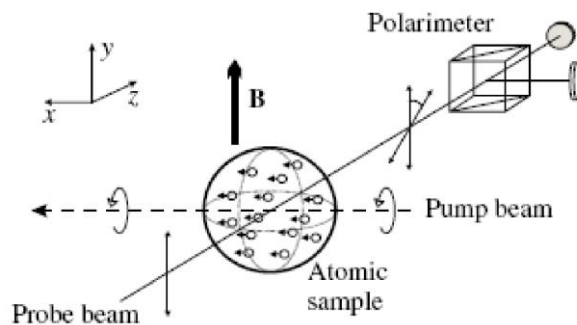


FIG. 1. Schematic diagram of a typical atomic magnetometer apparatus [2,9] of the sort considered here.

In conclusion, we have investigated fundamental sources of noise present in an idealized atomic magnetometer based on quantum nondemolition techniques. We find that such an approach can improve the sensitivity of magnetometric measurements beyond the shot-noise-limit over time scales much shorter than the relevant spin-relaxation time divided by an appropriate power of the number of atoms, depending on the degree of squeezing of the probe light. However, for longer time scales,

Can a Quantum Nondemolition Measurement Improve the Sensitivity of an Atomic Magnetometer?

Kā vislabāk pavadīt atvaļinājumu?

Mārcis Auziņš – Millera viesprofesors Bērklijas universitātē,
2005. gads



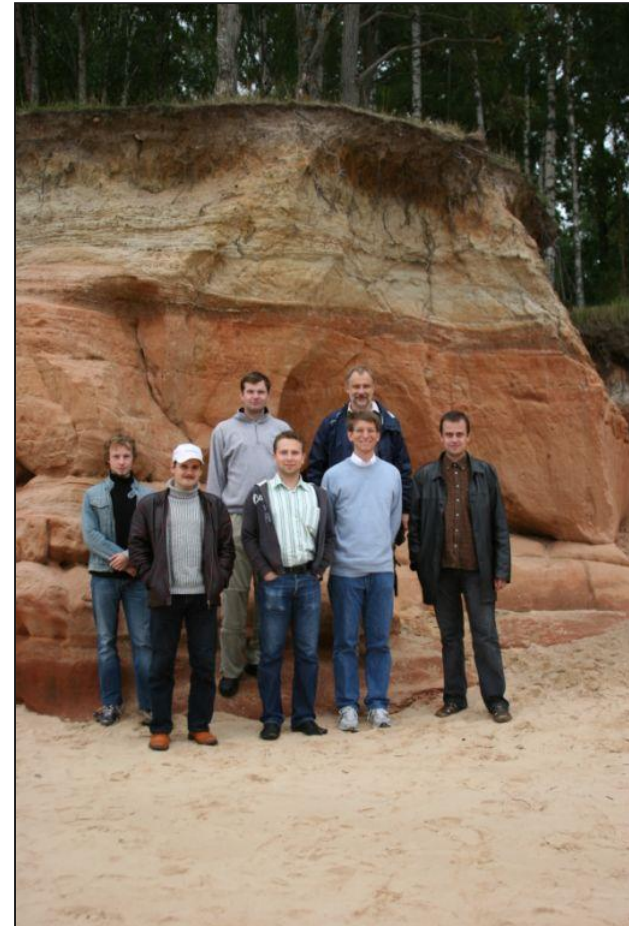
... piederība Latvijas Universitātei

Ar savu laboratoriju:

LU Fizikas un matemātikas fakultātē



Atpūtas brīžos

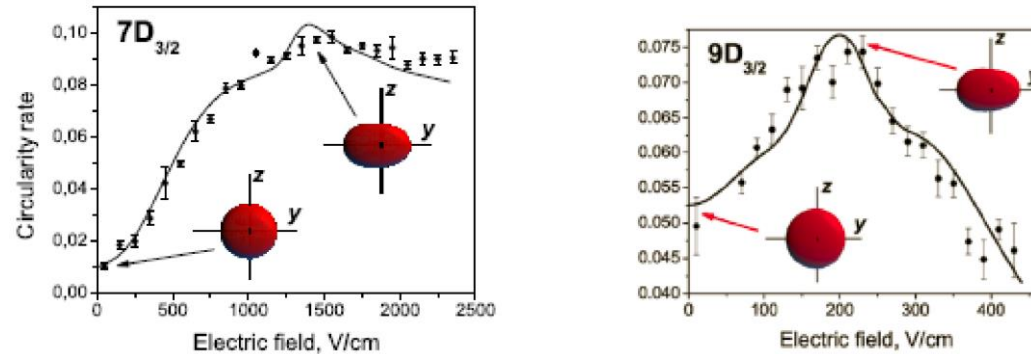


2005. gadā LU Fizikas un matemātikas fakultātē atklāts Lāzeru centrs, zinātniskais vadītājs – Mārcis Auziņš



Electric-Field-Induced Symmetry Breaking of Angular Momentum Distribution in Atoms

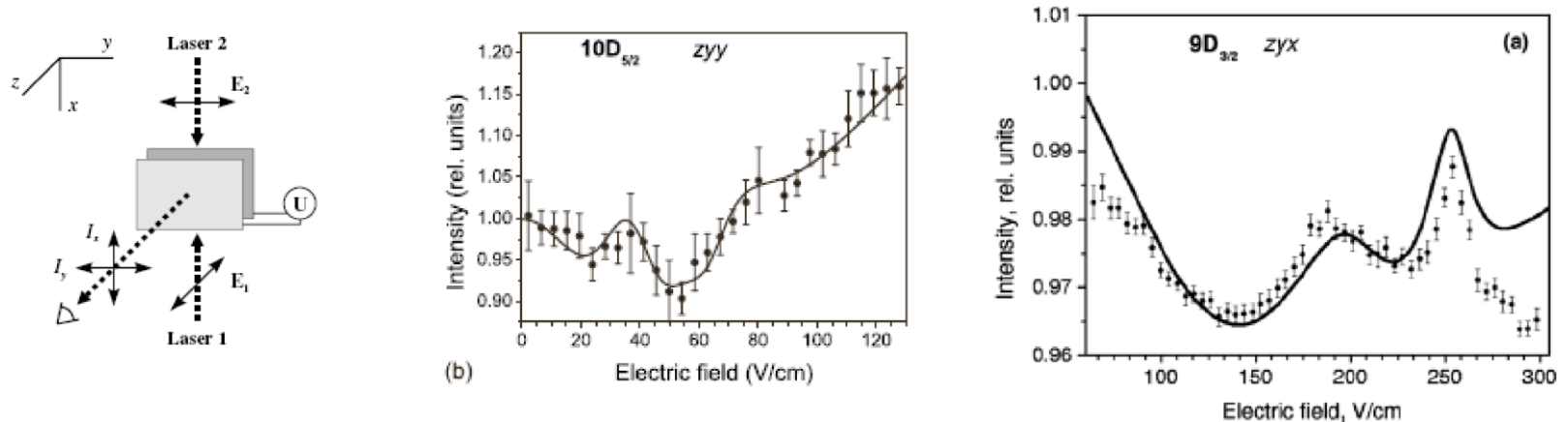
Marcis Auzinsh,^{*} Kaspars Blushs, Ruvins Ferber, Florian Gahbauer, Andrey Jarmola, and Maris Tamanis
Department of Physics and Mathematics, University of Latvia, Rainis Blvd. 19, Riga LV-1586, Latvia



PHYSICAL REVIEW A 75, 022502 (2007)

Level-crossing spectroscopy of the 7, 9, and $10D_{5/2}$ states of ^{133}Cs and validation of relativistic many-body calculations of the polarizabilities and hyperfine constants

M. Auzinsh,^{1,*} K. Bluss,¹ R. Ferber,¹ F. Gahbauer,¹ A. Jarmola,¹ M. S. Safronova,² U. I. Safronova,³ and M. Tamanis¹

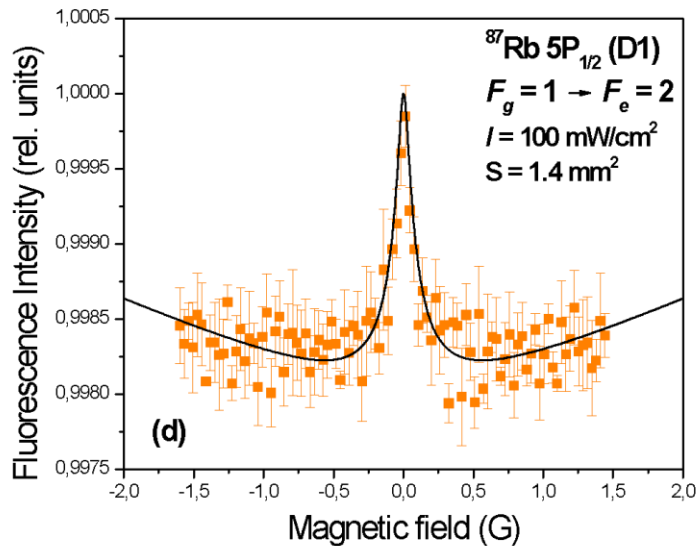


F -resolved magneto-optical resonances in the D_1 excitation of cesium: Experiment and theory

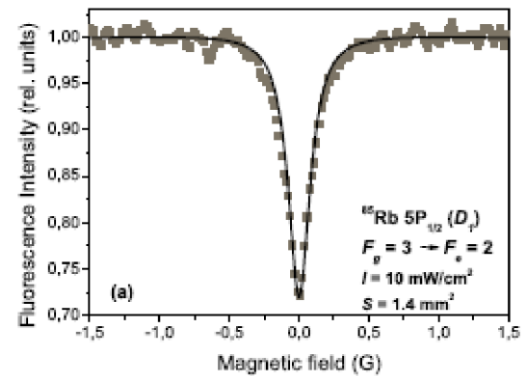
M. Auzinsh,* R. Ferber, F. Gahbauer, A. Jarmola, and L. Kalvans
The University of Latvia, Laser Centre, Rainis Boulevard, LV-1586 Riga, Latvia

Nonlinear magneto-optical resonances at D_1 excitation of ^{85}Rb and ^{87}Rb for partially resolved hyperfine F levels

M. Auzinsh,* R. Ferber, F. Gahbauer, A. Jarmola, and L. Kalvans

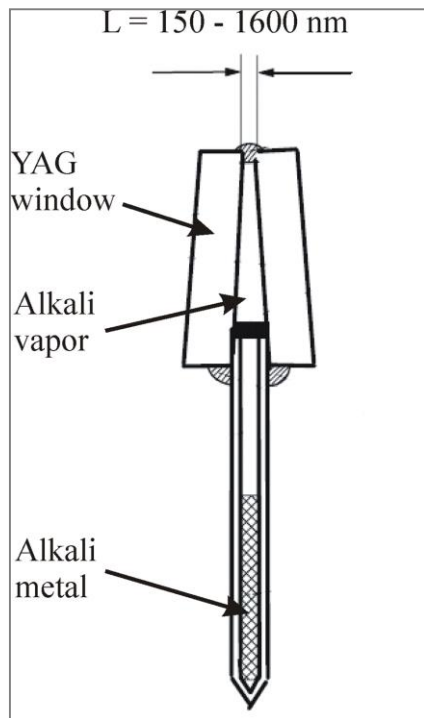


Gaišā rezonanse



Tumšā rezonanse

Sadarbībā ar Armēnijas ZA Fizikālo problēmu institūtu iegūta iespēja LU Lāzeru centrā pētīt unikālu objektu: nanoizmēra šūnu ar sārnu metālu atomiem



Prof. Dāvids Sarkisjans

PHYSICAL REVIEW A 81, 033408 (2010)

Nonlinear magneto-optical resonances at D_1 excitation of ^{85}Rb and ^{87}Rb in an extremely thin cell

M. Auzinsh,^{1,*} R. Ferber,¹ F. Gahbauer,¹ A. Jarmola,¹ L. Kalvans,¹ A. Papoyan,² and D. Sarkisyan²

¹Laser Centre, The University of Latvia, 19 Rainis Boulevard, LV-1586 Riga, Latvia

²Institute for Physical Research. NAS of Armenia. Ashtarak-0203. Armenia

Profesora Mārča Auziņa docētie kursi fizikas bakalaura un maģistra studijās

Kvantu fizika (Fizi4008)
Atomi ārējos laukos (Fizi4012)
Specseminārs I (Fizi5035)
Specseminārs II (Fizi5034)
Specseminārs III (Fizi6011)
Mūsdienu kvantu fizikas problēmas
(Fizi6010)
Kvantu fizikas paradoksi (Fizi4287)
Eksperimentālo datu statistiskā
apstāde (Fizi3190)

Doktorantu darbu vadība:

Dr. A. Ekers
Dr. J. Alnis
Dr. K. Blušs
Dr. K. Mičulis
Dr. A. Atvars
L. Kalvāns (iesniegts promocijas darbs)



**Mārcis Auziņš –
Springera izdevniecības Centrāleiropas fizikas žurnāla redaktors**



The image shows a screenshot of the Springer website. At the top left is the Springer logo, which consists of a chess knight icon and the word "Springer". Below the logo is a navigation bar with the following links: ACCUEIL, MY SPRINGER, DISCIPLINES, SERVICES, and ÉDITIONS & MARQUES. Below the navigation bar is a breadcrumb trail: » *Physique* Home > Physique. Below the breadcrumb trail is another navigation bar with the following links: SOUS-DISCIPLINES, JOURNALS, BOOKS, TEXTBOOKS, SERIES, and a printer icon. Below the navigation bar is a section for the Central European Journal of Physics. On the left is a cover image of the journal, which features a diamond and the text "Central European Journal of Physics". To the right of the cover image is the title "Central European Journal of Physics" in a large, blue, serif font. Below the title are the following details: ISSN: 1895-1082 (print version), ISSN: 1644-3608 (electronic version), and Journal no. 11534. At the bottom right of the section is a button that says "ORDER OR RECOMMEND TO LIBRARIAN".

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Central European Journal of Physics

ISSN: 1895-1082 (print version)
ISSN: 1644-3608 (electronic version)
Journal no. 11534

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Eiropas Fizikas biedrības izpildkomitejas loceklis



The screenshot shows the website of the European Physical Society (EPS). The header features the EPS logo and the tagline "more than ideas". The navigation menu includes "home", "about us", "activities", "conferences", "directory", and "membership". The breadcrumb trail indicates the current location is "home > directory".

The main content area is titled "Executive committee" and contains a table with two columns: "role" and "membre". The table lists the following members and their roles:

role	membre
member	Auzinsh Marcis (IM059453)
member	Ferdinande Hendrik (IM711200)
member	Kastberg Anders (IM070372)
member	Proykova Ana (IM080951)
member	Wandelt Klaus (IM080952)
president	Kolwas Maciej (IM059545)
treasurer	Latimer Colin (IM090015)
member	De Wolf Els (IM070357)
member	Biscari Caterina (IM049392)
president-elect	Cifarelli Luisa (IM080444)
secretary	Knoop Martina (IM080922)

On the left side of the page, there is a sidebar menu with the following items:

- directory
- associate members
- collaborating societies
- committees
- council
- divisions
- fellows
- groups
- honorary members
- national societies
- past presidents
- secretariat

Domājot par topošo grāmatu:

kopā ar Bērklijas universitātes profesoru D. Budkeru



This book is addressed to upper-level undergraduate and graduate students involved in research in atomic, molecular, and optical physics. It will also be useful to researchers practicing in this field. It gives an intuitive, yet sufficiently detailed and rigorous introduction to light-atom interactions with a particular emphasis on the symmetry aspects of the interaction, especially those associated with the angular momentum of atoms and light. The book will enable readers to carry out practical calculations on their own, and is richly illustrated with examples drawn from current research topics, such as resonant nonlinear magneto-optical effects.

Marcis Auzinsh is Rector of the University of Latvia

Dmitry Budker is Professor of Physics at the University of California at Berkeley, USA

Simon M. Rochester is a Graduate Student Researcher at the University of California at Berkeley, USA

"This is an excellent undergraduate textbook which provides a modern treatment of atom-light interactions from an experimentalist's perspective. I recommend this book to any student who aims for a deep understanding of the concepts in atomic physics and how to apply them to current research topics."

Dieter Jaksch, Oxford University

"Many modern atomic physics experiments use subtle effects of atom-light interactions, be they the destructive interference associated with coherent superpositions, or the dynamics of optical pumping, or alignment to orientation conversion. Having such topics discussed in a coherent theoretical framework provides an excellent resource."

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Cover image: The cover illustrates several themes discussed in the book. The red band represents a laser beam. The yellow shapes are angular-momentum probability surfaces representing a time progression of atomic polarization. The green contour plots represent electron density in an oscillating atomic dipole.

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LIGHT-ATOM
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