The last article of the volume is the review by L. P. Gor'kov entitled "Disorder and interactions in a system of quasi-one-dimensional electrons." This section of another science—one-dimensional physics—is very naturally combined with the remaining contents of the volume. The merits of the article itself are brevity, clarity and the great number of new original results. Apparently, this is the first review article on one-dimensional localization, where the effect appears not as a mathematical phenomenon, but as a defining property of an entire class of real substances whose properties are here discussed.

In conclusion the book must be judged as a great achievement of the authors and the editors, and must be warmly recommended to the reader. Unfortunately, the book itself was a long time in production, and its Russian translation will reach the reader with an even greater delay. Inevitably part of the material will become outdated. This can be seen even now, and by the time the Russian translation appears the number of incongruities will increase. This can be avoided by including in the translation supplements or editorial notes.

A school on the electronic structure of solids

I. I. Mazin
Usp Fiz. Nauk **155**, 735–736 (August 1988)

Ed. M. Yussouff. *Electronic Band Structure and Its Applications.* Springer-Verlag, Berlin; Heidelberg; New York; London; Paris; Tokyo, 1987, 440 pp.

The book under review is a collection of lectures and reports presented at the international school on electronic structure of solids which took place in India in the fall of 1986. The collected materials are not homogeneous in their quality. Some lectures are reviews of the activity of well-known western groups over a period of several years, some are essays on the urgent problems of band theory, some are simply scientific reports. Because of this, considerable attention will be devoted to some materials in this review, a lesser amount to others, and some will simply be listed.

The lecture by O. K. Andersen, O. Jepsen, and M. Soba is entitled "Linear Methods of Calculating Band Structure." It occupies almost 60 pages and is devoted to a presentation of the current state of the method of linear MT-orbitals (LMTO), including the theory of transformations of the MT-orbitals and the method of LMTO-strong coupling. For those who are acquainted with the well-known Trieste lecture by O. K. Andersen (O. K. Andersen, O. Jepsen, and D. Glötzel, *Highlights of Condensed Matter*, North Holland, N. Y., 1985) we note, that this lecture is, in fact, a reworking of the Trieste lecture. Although during the past two years the ideological content has not undergone much change, a much more precise and clear presentation of the ideology of the modern LMTO method has been achieved. To those wishing to study this method one can recommend specifically this lecture as being suitable for today.

The lecture by S. G. Louis is a review of the extensive activity of the author together with M. S. Hibertsen on calculating quasi-particle spectra in semiconductors "from first principles," including the investigation of corrections to the theory of the density functional. This review contains to some extent all the work of this group except for the latest papers (1987) on calculations of the dielectric susceptibility of semiconductors.

The third lecture of a review nature is the one by R. Zeller. It presents results obtaining by Dederichs, Zeller and other representatives of the Ülich Institute of Solid State Physics in calculating the electronic structure of impurities, particularly of magnetic ones, in transition metals. We note that in this lecture, as in the preceding one, very little is said concerning the technique of the corresponding calculations—the emphasis is on the results of the work.

While the lectures referred to above are, as has already been said, reviews of the work of the corresponding groups, the lectures by R. Heidok ("The method of recursions"), by A. Bensil ("The Modern Theory of Disordered Alloys") and by H. Neddermeyer ("Photoemission in Metals") are much closer to lectures in the direct sense of this word, i.e., they have rather an educational aim—to give an idea of the subject to a person who is not a specialist literally in the given field. Quite brief (10–30 pages), but sufficiently exhaustive, these lectures are very interesting to read.

Particular mention should be made of the report by W. E. Pickett "The Relationship of the Theory of the Density Functional to the Problem of Heavy Fermions." A well-known theoretician and at the same time an excellent specialist in the field of band calculations, he gives a clear concept of what can and what cannot be provided by the modern technique of one-electron calculations for the understanding and description of heavy-fermion systems. This article, or rather, essay, will be interesting and useful to a wider circle of readers—both to "band specialists," involved in calculations "from first principles," and also to "abstract theoreticians" involved in constructing model theories of heavy-fermion systems. In my opinion it would be useful to translate this article.

I shall list several other articles of a more special nature: M. Yussouff—"A Rapid Self-Consistent KKR method." O. Gunnarsson, R. O. Jones, and K. Schönhammer—"Formalism of the Density Functional: V_{XC}, discontinuities, local density approximation." S. Demanja—"Hydrogen in transi-

tion metals." S. K. Sikka and V. Vidjayakumar—"Changes in the electronic structure at high pressures." B. L. Diorffi *et al.*—"Magnetism and chemical order in alloys." J. B. Sokoloff—"Anomalous electronic structure and transport properties of quasicrystals." The book contains a number of other articles which are, apparently, of somewhat lesser interest.

High magnetic fields in semiconductor physics

A. P. Silin

Usp. Fiz. Nauk **155**, 736–737 (August 1988)

High magnetic fields in semiconductor physics. Ed. G. Landwehr. Springer-Verlag, Berlin; Heidelberg; New York; London; Tokyo, 1987. 562 pp. (Springer Series in Solid-State Sciences V. 71)

The book under review contains papers presented at the international conference "Application of High Magnetic Fields in Semiconductor Physics" which took place between 18 and 22 August 1986 in Würzburg (FRG). This conference was devoted to the urgent problems of semiconductor physics—the quantum Hall effect, the physics of semiconductor heterostructures and superlattices, the metal-dielectric transition, semimagnetic semiconductors and other complicated problems.

The book consists of nine parts. The first two parts (27 reports) are devoted to the integral and fractional quantum Hall effect. The scaling and percolation approximation to the quantum Hall effect, the density of states at the Landau levels in two-dimensional systems, and the quantum Hall effect in bicrystals are investigated. One should note the review papers by T. Ando on localization on Landau levels in two-dimensional systems and by I. V. Kukushkin and V. B. Timofeev on the fractional quantum Hall effect.

The third and fourth parts contain 27 reports devoted to the investigation of the effect of a magnetic field on the properties of semiconductor heterostructures and superlattices. For these systems a discussion is given of the tunnel and magnetoplasma resonances, magnetoluminescence, inelastic scattering of light, and also transport phenomena in high magnetic fields. Of particular interest is the investigation of magnetotransport in δ-like layers of donors (F. Koch, A. Zrenner, and K. Ploog) and in the submicron semiconductor wires (R. Taylor *et al.*).

The fifth part (4 papers) examines the metal dielectric transition in strong magnetic field (in n-type silicon, in InSb, in the GaAsAlGaAs heterostructure). We note the discussion of the Anderson localization in three-dimensional systems in quantizing magnetic fields (I. Ono, T. Otsuki).

The sixth part (8 papers) is devoted to an investigation of semimagnetic semiconductors (A^4B^6 compounds). Magnetospectroscopy, the Shubnikov–de Haas and Hall efffects and also metal-dielectric transition are discussed. Of particular interest are the review papers by H. Pascher and G. Bauer, and also by M. Grinberg which report the latest achievements in the physics of semimagnetic semiconductors.

The seventh and eighth parts contain 12 papers devoted to the investigation of magnetooptics and magnetotransport in three-dimensional systems. Nonlinear spectroscopy and the magnetophonon effect in narrow-gap semiconductors, hopping conductivity in n-InP and other problems are discussed. We note the review of theoretical papers on the Wigner crystalization (R. Gerhards) and the investigation of the condensation of electrons in n-HgCdTe (G. Nimtz).

In the last (ninth) part (3 reports) experiments are examined on ultrahigh megagauss magnetic fields, in particular, the investigation of magnetospectroscopy of excitons in quantum wells of GaAs-AlGaAs, heterostructures, in anthracene and BiI_3, and also of cyclotron resonance of electrons in PbTe, and electrons and holes in GaAs-AlGaAs superlattices.

The book under review gives a sufficiently complete idea of a number of interesting and at the moment rapidly developing directions of semiconductor physics (the quantum Hall effect, and semiconductor superlattices). The reports are written by authors who are prominent specialist in these fields (T. Ando, K. von Klitzing, V. B. Timofeev, K. Ploog and others). The books is excellently illustrated (378 figures).

The contents of the book are of essential interest for a wide circle of theoreticians and experiments specializing in a solid-state physics.

Translated by G. M. Volkoff