

growth in resistivity was made almost three decades ago; his findings disturbed the theoretical community and initiated an epic period of research that continues today. Regrettably, however, although a good part of our current research on highly correlated materials is founded on concepts and developments in the theory of local moments, until now there have been no appropriate texts in this field: The prospective student has been faced with the daunting task of navigating a labyrinthine trail of papers and references stretching back to the 1960s.

Alex Hewson's new book does much to alleviate this difficulty. In ten chapters it leads the reader systematically from the early development of models for magnetic ions, through a thorough treatment of the theory of the Kondo effect and mixed valence ions, to a final discussion of how these ideas impinge on current research in heavy-fermion and cuprate superconductors.

Hewson has carefully held to a domain where the theory is mature and uncontroversial. An agreeable feature of the book is the wealth of experimental figures and references that complement the theoretical development. Several detailed appendices take the reader through more involved calculations, such as the scaling theory of the overscreened Kondo model and avoid disturbing the flow of ideas in the main text. A weakness of this book is the absence of worked exercises. These would have been helpful in using the book in a graduate course and might be a useful feature of a future edition.

In his opening discussion of the early development of models for magnetic ions, Hewson begins with Friedel's concept of the virtual bound state resonance and builds to a discussion of both the Anderson and *s-d* ("Kondo") models. The second chapter is devoted to the resistance minimum in scattering off magnetic ions and Kondo's explanation of the phenomenon. Hewson carefully explains how Kondo's innocent-looking logarithmic corrections to the scattering rate confirmed Anderson's superexchange concept and initiated a renaissance of interest in the strong correlations driven by magnetic ions.

Chapters 3 through 6 take the reader through the perturbation theory of the Kondo effect, on to the concept of the renormalization group (where the analytic Anderson-Yuval and numerical Wilson approaches are covered in some detail), and ultimately show the reader how this leads to the concept of a strong cou-

pling expansion and the Fermi liquid fixed point.

The second part of the book describes developments that took place in the 1980s. Here Hewson describes two complementary developments: the exact Bethe *Ansatz* approach and the $1/N$ expansion that proved so important in early developments in heavy-fermion physics. Hewson ends these discussions with a chapter devoted to experiment, showing how beautifully the theory squares up with a wide range of experiments taken from transition metal and rare-earth systems.

The concluding chapter discusses the new developments in highly correlated materials, illustrating the way in which many of the concepts, taken from single-impurity physics, have influenced current understanding of heavy-fermion compounds. The book ends with a summary of some of the problems posed by cuprate superconductivity and the new ideas that have been proposed to explain them.

The Kondo Problem of Heavy Fermions is a concise introduction to the theory of local-moment physics. Hewson provides a thorough and reliable foundation for those interested in research in strongly correlated materials. I heartily recommend it.

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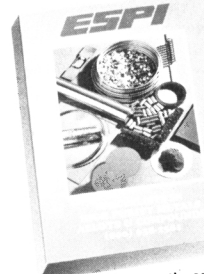
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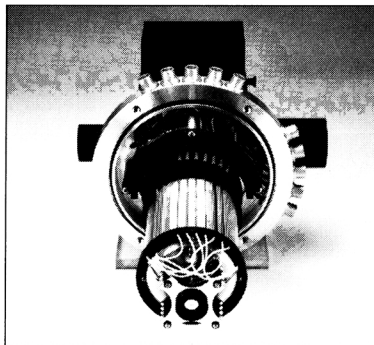
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