

Joachim Wosnitza

# Fermi Surfaces of Low-Dimensional Organic Metals and Superconductors

With 88 Figures



Springer

# Contents

|   |     |
|---|-----|
| <b>1. Introduction</b> .....                                | 1   |
| <b>2. Some Principal Properties</b> .....                   | 7   |
| 2.1 Synthesis .....   | 7   |
| 2.2 Quasi One-Dimensional Systems .....                     | 8   |
| 2.2.1 Crystal Structure of $(\text{TMTSF})_2\text{X}$ ..... | 8   |
| 2.2.2 Electronic Structure .....                            | 10  |
| 2.2.3 Ground-State Instability .....                        | 12  |
| 2.2.4 Superconductivity .....                               | 22  |
| 2.3 Quasi Two-Dimensional Systems .....                     | 28  |
| 2.3.1 Some Crystal Structures .....                         | 29  |
| 2.3.2 Band Structure .....                                  | 34  |
| 2.3.3 The Superconducting State .....                       | 39  |
| <b>3. Magnetic Oscillations in Metals</b> .....             | 61  |
| 3.1 de Haas-van Alphen Effect .....                         | 62  |
| 3.1.1 Basic Theory .....                                    | 62  |
| 3.1.2 Experimental Realization .....                        | 66  |
| 3.2 Shubnikov-de Haas Effect .....                          | 67  |
| 3.3 Angular-Dependent Magnetoresistance Oscillations .....  | 68  |
| <b>4. The Fermi Surfaces</b> .....                          | 77  |
| 4.1 One-Dimensional Organic Metals .....                    | 77  |
| 4.2 Two-Dimensional Organic Metals .....                    | 80  |
| 4.2.1 $\alpha$ Phase .....                                  | 80  |
| 4.2.2 $\beta$ Phase .....                                   | 100 |
| 4.2.3 $\kappa$ Phase .....                                  | 117 |
| 4.2.4 $\Theta$ Phase .....                                  | 129 |
| 4.2.5 Other Materials .....                                 | 133 |
| <b>5. Conclusion</b> .....                                  | 145 |
| <b>References</b> .....                                     | 149 |
| <b>Index</b> .....  | 167 |