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	Methods of producing pressure
1	Ice-bomb technique
1	Ice-bomb technique
	Frozen oil–kerosene
t	Liquid helium
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n	Helium gas
que)	Liquid helium
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estigating the Fermi surface
e summarized.

e.g., Shoenberg, 1957)

method of determining the
discovered by de Haas and
tion of the magnetic-suscepti-
n the applied magnetic field,
in $1/H$ (more correctly $1/B$)

and from this period, P, the extremal cross-sectional area, A (or areas) of the Fermi surface which is normal to the field, can be determined from the relationship:

$$A = \frac{2\pi e}{\hbar P} \tag{1}$$

where e and $\hbar$ have their usual significance.

From the temperature dependence of the *amplitude* of the effect, the effective mass

$$m_c^* = \left(\frac{\hbar^2}{2\pi}\right)\frac{\partial A}{\partial E} \tag{2}$$

for the relevant extremal orbit can be found. Once this is known, the life time, τ, of the electrons in that orbit can also be found from the *field* dependence of the amplitude.

In order to observe the effect $\omega_c\tau$ should be comparable or large compared to unity and $\hbar\omega_c \gg kT$. Here ω_c is the appropriate cyclotron frequency; $\omega_c \equiv \frac{eB}{m_c^*}$. The first condition on ω_c implies that high fields are needed and long relaxation times, i.e., very pure materials at low temperatures so that the conduction electrons are not scattered too frequently by either impurities, imperfections or phonons. The second condition ensures that separation of the Landau levels is large compared to their thermal broadening.

There are several techniques commonly in use for observing de Haas–van Alphen oscillations.

1. The torque method. In this the specimen is suspended from a torsion element in a uniform magnetic field. The couple on the element is then measured as a function of magnetic field for different relative orientations of crystal and field. The method is generally used for looking at small parts of the Fermi surface with comparatively small cross-sections.

2. The pulsed-field method. In this technique large magnetic fields (up to, say, 200 kG) are produced by discharging a bank of condensers through a coil in which the specimen (suitably cooled) is placed. The magnetization of the specimen is measured by a pick-up coil surrounding the specimen; effects due to the changing magnetic field are largely compensated by means of a second pick-up coil connected in opposition