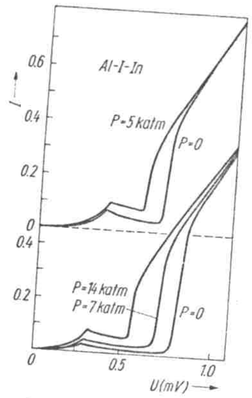

Fig. 2. Current–voltage characteristics of Al–I–In samples at different pressures. $T = (1.17 \pm 0.02)$ °K; normalized units are along the I-axis

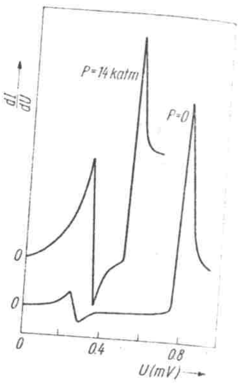

Fig. 3. dI/dU–U characteristics of Al–I–In sampl different pressures. $T = (1.16 \pm 0.02)$ °K

where the error does not include the inaccuracy in pressure measureme Such T_c change of In films with pressure excellently coincides with Berm Brandt, and Ginzburg's measurements [10] on massive indium.

Fig. 2 shows voltage–current characteristics for two Al–I–In samples plott at different pressures. The energy gap was defined from the maxima of t (dI/dU)–U characteristics (Fig. 3).

Fig. 4 shows the result of high pressure influence on the energy gap of indiu For comparison the $2\Delta(p) = 3.69\,kT_c$ line is drawn which in fact correspo to the critical temperature change. The gap values obtained by extrapolati $2\Delta(T)$ to $T = 0$ °K are also included in Table 1. From experiments it is foun

$$\frac{d\,2\Delta}{dp} = -(1.43 \pm 0.13) \times 10^{-5}\,\frac{\text{meV}}{\text{atm}}.$$

The energy gap of In at zero pressure, $2\Delta(0.0) = (3.69 \pm 0.04)\,kT_c$, is in goo agreement with data obtained from precision measurements of critical fi curves [11], where the coefficient defining a devia tion from the parabola was found to be

$$a_{\text{In}} = 2\pi\gamma\frac{T_c^2}{H_0^2} = 0.985 \qquad (3$$

where

$$\gamma = \frac{2}{3}\pi^2 k^2 N. \qquad (4$$

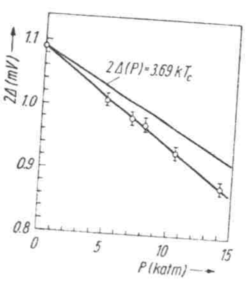

Fig. 4. Change of the superconducting indium energy gap under pre sure. ○ experimental points

the basis of the thermodynamic relation [1]

$$\Delta = k\sqrt{\frac{\pi}{6\gamma}}\,H_0 \qquad (5)$$

(3) we have

$$\frac{\Delta}{kT_c} = 1.82\,a^{-\frac{1}{2}}. \qquad (6)$$

en from our experiments it follows that the parameter a increases with ure from 0.985 to 1.04 ($p = 14$ katm), i.e. it approaches the BCS case. imenta points $\Delta h = h - (1 - t^2)$ given in [10] for indium clearly show dency to the above mentioned increase of a with pressure (see Fig. 6 in In principle on the basis of (5) one may estimate the change of state ity N with pressure. Using our gap data and those of $H_0(p)$ from [10], state density seems to decrease by no more than 2% at 14 katm.

hallium: Because of quick oxidation of Tl films Al–I–Tl samples were ed in the bomb immediately after preparation, and control measurement all pressure were carried out after some compression cycles. After such cedure the film critical temperature was (2.38 ± 0.01) °K at zero pressure. energy gap here is $2\Delta(0.0) = (0.75 \pm 0.01)$ meV $= (3.65 \pm 0.06)\,kT_c$, t is in good agreement with Clark's recent measurements [12].

n the small pressure range (2000 to 4000 atm) the anomalous change of al temperature typical of massive pure Tl [13] was not observed. The al temperature linearly decreased up to (2.34 ± 0.01) °K at $p = 8$ katm g in qualitative agreement with Gey's data [14] on the dependence of T_c of Tl on residual resistance produced by plastic deformation at different sures.

ig. 5 shows I–U characteristics for Al–I–Tl at different pressures. The gap e obtained at 8 katm, $2\Delta(8.0) = (0.73 \pm 0.01)$ meV $= (3.64 \pm 0.06)\,kT_c$, ws rather weak dependence in this pressure range. However, this does not ude the possibility that $2\Delta/kT_c$ changes for llium at higher pressures. Work in this direc is in progress.

he main result of gap tunnelling measurements uperconductors under pressure is that the t of $2\Delta/kT_c$ decrease initially discovered on which is a representative of superconductors h strong electron–phonon interaction, shows ferent dependence on superconductors with rmediate coupling: In, Sn, and perhaps Tl. This umstance makes theoretical investigations essary to obtain a relation connecting the gap

5. Voltage–current characteristics of Al–I–Tl samples at different sures. $T = (1.16 \pm 0.02)$ °K; normalized units are along the I-axis