the gel was washed away, and the particles, about 1 μ across, collected on a glass plate. They proved to show the spherulitic figure, and were practically indistinguishable from the particles slowly grown in the gold and silver films (Fig. 2). Well-formed crystals with birefringent edges were also observed, and can be seen in the photograph.

This appears to be the first occasion on which spherulites of pure metals have been observed. They may have an important bearing on the question of the stability of the crystal lattice.

E. N. DA C. ANDRADE.
J. G. MARTINDALE.

Physics Laboratory,
University College,
Gower Street,
London, W.C.1.
July 27.

[1] H. W. Morse, C. H. Warren and J. D. H. Donnay, *Amer. J. Sci.*, **23**, 421; 1932.

The New Field Theory

IN a recent series of articles[1] Born has developed, with Infeld, a new theory of the electromagnetic field that solves the difficulties connected with the self-energy of the electron. In II an elegant form is given for the Lagrangian of the electromagnetic field, but the Lagrangian alone does not completely specify the electromagnetic field since one must add the assumption[2] that f_{kl} is the curl of a potential vector φ_k. The method suggested[3] for including the Einstein gravitational equations within the theory would further mar the elegance of the Lagrangian.

It seems possible to give a Lagrangian function based upon the projective theory of relativity[4] which will not only lead to the Born field equations in the Galilean case, but will at the same time automatically make f_{kl} the curl of φ_k, and will also contain ten further 'gravitational' equations. The Lagrangian lacks the elegance of that proposed in II, and the field equations derived from it are extremely complicated.

In the projective theory of relativity the gravitational potential g_{ab} and the electromagnetic potential φ_a enter the projective metric $\gamma_{\alpha\beta}$ in such a way that the projective curvature scalar has the value

$$B = R - \varphi^a_b \varphi^b_a = R + g^{ac} g^{bd} \varphi_{bc} \varphi_{da},$$

where R is the Riemannian curvature scalar of the g_{ab}, and φ_{ab} is, apart from a factor, the curl of φ_a. If we define field equations as the conditions that the variation with respect to the $\gamma_{\alpha\beta}$ of the invariant integral

$$\int (\sqrt{1 + \alpha B} - 1)\sqrt{-g}\, dx^1 dx^2 dx^3 dx^4 \quad (\alpha \text{ a constant})$$

shall vanish, the four field equations corresponding to the variation of φ_a will, in the Galilean case, reduce to those of I[5] and will therefore lead to the static field obtained in both I and II.

B. HOFFMANN.

University of Rochester,
Rochester,
N.Y.
July 19.

[1] For example, *Proc. Roy. Soc.*, **143**, 410; 1934; referred to as I, and **144**, 425; 1934; referred to as II.
[2] II, p. 433, Eq. (3·1).
[3] II, p. 435.
[4] See "Projektive Relativitätstheorie", O. Veblen, *Ergebnisse der Math.*, Berlin, 1933.
[5] With the constant subtracted as in I, p. 432, Eq. (7·10).

Further Band Systems of Aluminium Hydride

SOME new band systems of aluminium hydride at 2700 A. and 4950 A. have already been reported[1]. Using a new construction for the aluminium electrode which permitted large energies in the arc at a high pressure of hydrogen, we have obtained the band system at 4950 A. in the first order of our 6·5 m. concave grating. The band system has been analysed and is found to belong to a $^1\Sigma^{***} \rightarrow {}^1\pi$ transition, where the lower term $^1\pi$ is in common with the well-known band system $^1\pi \rightarrow {}^1\Sigma$. Of the three branches expected (P, Q, R) only the Q and P branch has been found, owing to the strong overlapping from the AlO bands. The following constants have been evaluated.

	B_0	D_0	J_0	r_0	ω_0 cm.$^{-1}$	ν_0 cm.$^{-1}$
$^1\Sigma^{***}$	6·120	$-11{\cdot}33 \times 10^{-4}$	$4{\cdot}53 \times 10^{-40}$	1·68 A.	900	20277·16

From the combination rule of R. de L. Kronig and ground state $^1\Sigma^+$ of AlH predicted by Mulliken, it is found that the term is $^1\Sigma^-$.

Like most of the band systems of aluminium hydride, the band at 4950 A. shows a remarkable 'cut off' of the series. The P and Q branches are both cut off at $j = 19$. Accordingly, the predissociation originates from the $^1\pi$ term.

E. Hulthén and R. Rydberg[2] consider that the predissociation and the pressure effect in the lowest $^1\pi$ term of aluminium hydride is due to a 'barrier' 400 cm.$^{-1}$ above the dissociation limit. Owing to a leak past this barrier, the terms higher than $j = 20$ in v_0 are diffuse. Perhaps this explains the predissociation in the new $^1\Sigma^{***} \rightarrow {}^1\pi$ system.

Details will be published elsewhere.

W. HOLST.

Laboratory of Physics,
University of Stockholm.
July 2.

[1] *Z. Phys.*, **89**, 40; 1934.
[2] NATURE, **131**, 470, April 1, 1933.

Situation of the A ($^3\Sigma$) Level in the Nitrogen Molecule

HERZBERG and Sponer[1] have recently reported that the $A(^3\Sigma)$ level of N_2 lies 6·14 volts above the X (ground) level. They have assumed in deriving this value that Kaplan's new band system[2] is indeed the intercombination $A - X$. For this hypothesis the spacing of Kaplan's upper vibrational levels affords some support. On the other hand, direct estimates of the position of this level by the method of electron collision, including Sponer's[3] original determination, agree in placing it at least two volts higher than the above value.

A careful repetition of Sponer's determination employing many technical refinements has recently been completed in this laboratory. We obtain $8{\cdot}34 \pm 0{\cdot}05$ volts for the interval $A - X$, in substantial agreement with previous results, but with an accuracy much greater than that claimed by any previous worker. A detailed account of this work will appear elsewhere.

If Herzberg and Sponer's assignment is to be accepted, this discrepancy must be explained. Their suggestion that in all electron collision measurements the excitation of the Second Positive Bands is due to a secondary collision process does not appear to us adequate. First, at the pressures used in our experiments (3×10^{-3} mm.) such collisions are