quency, since as frequency is increased a greater degree of ionization is required for a given amplitude of reflection from a given meteor trail.

The fact that meteors can be detected by means of signals from radio equipment of roughly one kilowatt power in the 30-megacycle frequency range, should, therefore, be of interest to astronomers and other investigators who do not have access to radio transmitting equipment of very high power.

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Confirmation of Assignment of 2.6 *h* Ni to a Mass Number of 65

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THE assignment of the 2.6 *h* Ni activity to a mass number of 65 which was recently reported on the basis of (n, p) reactions with copper samples of different isotopic abundances[1] has been independently confirmed using nickel preparations of various isotopic abundances.

Samples of NiO enriched in Ni^{62} and Ni^{64} were prepared with the calutron, purified, and analyzed mass-spectrographically by the Tennessee Eastman Corporation. Comparisons were made of the relative amounts of 2.6 *h* beta-activity produced during exposure of a sample enriched in Ni^{62}, a sample enriched in Ni^{64}, and nickel of natural isotopic abundance to the neutron flux of the Clinton pile. As is shown in Table I the relative activities agree with the relative amounts of Ni^{64} bombarded.

TABLE I. Evidence for production of 2.6 *h* Ni by the reaction: $Ni^{64}(n, \gamma)Ni^{65}$

	Natural Ni	Enriched Ni^{64}	Enriched Ni^{62}
Percentage of Ni^{64}	0.88[a]	85.1 ± 1	$1.8^{+0.2}_{-1.8}$
Percentage of Ni^{62}	3.8[a]	$1.0^{+0.1}_{-0.2}$	94.2 ± 0.2
2.6 *h* beta-activity (c/m/mg Ni at 100% geom.)	5.3×10^6	4.2×10^8	6.8×10^5
Specific activity (c/m/mg Ni^{64} at 100% geom.)	6×10^8	5×10^8	4×10^7

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Although the value for the specific activity from the enriched Ni^{62} sample is of low accuracy corresponding to the large uncertainty in the mass-spectrographic analysis for Ni^{64}, it is in agreement with the assignment to a mass number of 65.

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The Representation of Single Particle Operators in Two-Particle Form

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LET p_i and q_i be any pair of classical quantities or quantum-mechanical operators for the ith particle of a system of N particles and

$$P=\Sigma p_i, \qquad Q=\Sigma q_i$$

the corresponding quantities for the complete system. A small circle between the symbols denotes a generalized multiplication for which the distributive law is assumed to hold. Then

$$\begin{aligned} QoP &= \sum_{ij} q_i o p_j \\ &= N\Sigma q_i o p_i - \sum_{i<j} q_{ij} o p_{ij}, \end{aligned}$$

in which $p_{ij}=p_i-p_j$, $q_{ij}=q_i-q_j$. Consequently

$$\Sigma q_i o p_i = \frac{1}{N}\sum_{i<j} q_{ij} o p_{ij} + \frac{1}{N} QoP. \tag{1}$$

It is the purpose of this note to direct attention to three relations of the form (1) which may find a useful field of application in the development of the theory of nuclear structure.

(a) $p_i=q_i=\boldsymbol{\nabla}_i$, the vector gradient operator. Equation (1) becomes

$$\Sigma \nabla_i{}^q = \frac{1}{N}\sum_{i<j} \nabla_{ij}{}^q + \frac{1}{N}(\Sigma \boldsymbol{\nabla}_i)^q. \tag{2}$$

If now the center of mass of the system is at rest, the last term in the right-hand member of Eq. (2) may be omitted leaving the relation

$$\Sigma \nabla_i{}^q = \frac{1}{N}\sum_{i<j} \nabla_{ij}{}^q. \tag{3}$$

Equation (3) represents the internal kinetic energy of N isobaric particles in terms of the relative kinetic energy of pairs of particles.

(b) $p_i=\boldsymbol{\nabla}_i$, $q_i=\mathbf{r}_i$, $o\equiv x$ (the vector product). Then

$$\Sigma \mathbf{r}_i x \boldsymbol{\nabla}_i = \frac{1}{N}\sum_{i<j} \mathbf{r}_{ij} x \boldsymbol{\nabla}_{ij} + \frac{1}{N}\Sigma \mathbf{r}_i x \Sigma \boldsymbol{\nabla}_j. \tag{4}$$

With the center of mass at rest, Eq. (4) reduces to

$$\Sigma \mathbf{r}_i x \boldsymbol{\nabla}_i = \frac{1}{N}\sum_{i<j} \mathbf{r}_{ij} x \boldsymbol{\nabla}_{ij}. \tag{5}$$

Equation (5) states that the internal orbital angular momentum of an assemblage of particles can be expressed in terms of the relative angular momentum of pairs of particles. Both (4) and (5) remain valid if the multiplication operation is interpreted as the scalar product.

(c) $p_i=q_i=\mathbf{r}_i$ the vector distance from a fixed point. Then[1]

$$\Sigma r_i{}^q = \frac{1}{N}\sum_{i<j} r_{ij}{}^q + \frac{1}{N}(\Sigma \mathbf{r}_i)^q. \tag{6}$$

Consider now a system of N identical particles bound to-