

$^{14}\text{C}(^3\text{He},\text{X}): \text{res}$ 1972Ke08,1976Ch04

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	C. G. Sheu, J. H. Kelley, J. Purcell		ENSDF	5-Aug-2021

 $^{14}\text{C}(^3\text{He},\gamma)$:

1972VeZY: $^{14}\text{C}(^3\text{He},\gamma)$, $E=3.2\text{-}7.4$ MeV; measured $\sigma(E; E_\gamma, \theta(\gamma))$. ^{17}O deduced resonances, J, π .

1976Ch04: $E(^3\text{He})=3.2\text{-}7.5$ MeV ion beams, from the Stanford FN tandem Van de Graaff accelerator, bombarded a thin carbon film (enriched 50% ^{14}C). The γ -rays were detected by a $24\times 24 \text{ cm}^2$ NaI(Tl) crystal at $\theta=90^\circ$ with respect to the incident beam. At some energies, the angular distributions were measured in the range $\theta=0^\circ\text{-}135^\circ$. Energy levels at $^{17}\text{O}^*(21.7, 22.1, 22.6, 22.3, 22.5, 22.6, 22.7, 22.8, 22.9, 23.0, 23.1, 23.2, 23.3, 23.4, 23.5, 23.6, 23.7, 23.8, 23.9, 24.0, 24.1, 24.2, 24.3, 24.4, 24.5, 24.6, 24.7, 24.8, 24.9, 25.0, 25.1, 25.2, 25.3, 25.4, 25.5, 25.6, 25.7, 25.8, 25.9, 26.0, 26.1, 26.2, 26.3, 26.4, 26.5, 26.6, 26.7, 26.8, 26.9, 27.0, 27.1, 27.2, 27.3, 27.4, 27.5, 27.6, 27.7, 27.8, 27.9, 28.0, 28.1, 28.2, 28.3, 28.4, 28.5, 28.6, 28.7, 28.8, 28.9, 29.0, 29.1, 29.2, 29.3, 29.4, 29.5, 29.6, 29.7, 29.8, 29.9, 30.0, 30.1, 30.2, 30.3, 30.4, 30.5, 30.6, 30.7, 30.8, 30.9, 31.0, 31.1, 31.2, 31.3, 31.4, 31.5, 31.6, 31.7, 31.8, 31.9, 32.0, 32.1, 32.2, 32.3, 32.4, 32.5, 32.6, 32.7, 32.8, 32.9, 33.0, 33.1, 33.2, 33.3, 33.4, 33.5, 33.6, 33.7, 33.8, 33.9, 34.0, 34.1, 34.2, 34.3, 34.4, 34.5, 34.6, 34.7, 34.8, 34.9, 35.0, 35.1, 35.2, 35.3, 35.4, 35.5, 35.6, 35.7, 35.8, 35.9, 36.0, 36.1, 36.2, 36.3, 36.4, 36.5, 36.6, 36.7, 36.8, 36.9, 37.0, 37.1, 37.2, 37.3, 37.4, 37.5, 37.6, 37.7, 37.8, 37.9, 38.0, 38.1, 38.2, 38.3, 38.4, 38.5, 38.6, 38.7, 38.8, 38.9, 39.0, 39.1, 39.2, 39.3, 39.4, 39.5, 39.6, 39.7, 39.8, 39.9, 40.0, 40.1, 40.2, 40.3, 40.4, 40.5, 40.6, 40.7, 40.8, 40.9, 41.0, 41.1, 41.2, 41.3, 41.4, 41.5, 41.6, 41.7, 41.8, 41.9, 42.0, 42.1, 42.2, 42.3, 42.4, 42.5, 42.6, 42.7, 42.8, 42.9, 43.0, 43.1, 43.2, 43.3, 43.4, 43.5, 43.6, 43.7, 43.8, 43.9, 44.0, 44.1, 44.2, 44.3, 44.4, 44.5, 44.6, 44.7, 44.8, 44.9, 45.0, 45.1, 45.2, 45.3, 45.4, 45.5, 45.6, 45.7, 45.8, 45.9, 46.0, 46.1, 46.2, 46.3, 46.4, 46.5, 46.6, 46.7, 46.8, 46.9, 47.0, 47.1, 47.2, 47.3, 47.4, 47.5, 47.6, 47.7, 47.8, 47.9, 48.0, 48.1, 48.2, 48.3, 48.4, 48.5, 48.6, 48.7, 48.8, 48.9, 49.0, 49.1, 49.2, 49.3, 49.4, 49.5, 49.6, 49.7, 49.8, 49.9, 50.0, 50.1, 50.2, 50.3, 50.4, 50.5, 50.6, 50.7, 50.8, 50.9, 51.0, 51.1, 51.2, 51.3, 51.4, 51.5, 51.6, 51.7, 51.8, 51.9, 52.0, 52.1, 52.2, 52.3, 52.4, 52.5, 52.6, 52.7, 52.8, 52.9, 53.0, 53.1, 53.2, 53.3, 53.4, 53.5, 53.6, 53.7, 53.8, 53.9, 54.0, 54.1, 54.2, 54.3, 54.4, 54.5, 54.6, 54.7, 54.8, 54.9, 55.0, 55.1, 55.2, 55.3, 55.4, 55.5, 55.6, 55.7, 55.8, 55.9, 56.0, 56.1, 56.2, 56.3, 56.4, 56.5, 56.6, 56.7, 56.8, 56.9, 57.0, 57.1, 57.2, 57.3, 57.4, 57.5, 57.6, 57.7, 57.8, 57.9, 58.0, 58.1, 58.2, 58.3, 58.4, 58.5, 58.6, 58.7, 58.8, 58.9, 59.0, 59.1, 59.2, 59.3, 59.4, 59.5, 59.6, 59.7, 59.8, 59.9, 60.0, 60.1, 60.2, 60.3, 60.4, 60.5, 60.6, 60.7, 60.8, 60.9, 61.0, 61.1, 61.2, 61.3, 61.4, 61.5, 61.6, 61.7, 61.8, 61.9, 62.0, 62.1, 62.2, 62.3, 62.4, 62.5, 62.6, 62.7, 62.8, 62.9, 63.0, 63.1, 63.2, 63.3, 63.4, 63.5, 63.6, 63.7, 63.8, 63.9, 64.0, 64.1, 64.2, 64.3, 64.4, 64.5, 64.6, 64.7, 64.8, 64.9, 65.0, 65.1, 65.2, 65.3, 65.4, 65.5, 65.6, 65.7, 65.8, 65.9, 66.0, 66.1, 66.2, 66.3, 66.4, 66.5, 66.6, 66.7, 66.8, 66.9, 67.0, 67.1, 67.2, 67.3, 67.4, 67.5, 67.6, 67.7, 67.8, 67.9, 68.0, 68.1, 68.2, 68.3, 68.4, 68.5, 68.6, 68.7, 68.8, 68.9, 69.0, 69.1, 69.2, 69.3, 69.4, 69.5, 69.6, 69.7, 69.8, 69.9, 70.0, 70.1, 70.2, 70.3, 70.4, 70.5, 70.6, 70.7, 70.8, 70.9, 71.0, 71.1, 71.2, 71.3, 71.4, 71.5, 71.6, 71.7, 71.8, 71.9, 72.0, 72.1, 72.2, 72.3, 72.4, 72.5, 72.6, 72.7, 72.8, 72.9, 73.0, 73.1, 73.2, 73.3, 73.4, 73.5, 73.6, 73.7, 73.8, 73.9, 74.0, 74.1, 74.2, 74.3, 74.4, 74.5, 74.6, 74.7, 74.8, 74.9, 75.0, 75.1, 75.2, 75.3, 75.4, 75.5, 75.6, 75.7, 75.8, 75.9, 76.0, 76.1, 76.2, 76.3, 76.4, 76.5, 76.6, 76.7, 76.8, 76.9, 77.0, 77.1, 77.2, 77.3, 77.4, 77.5, 77.6, 77.7, 77.8, 77.9, 78.0, 78.1, 78.2, 78.3, 78.4, 78.5, 78.6, 78.7, 78.8, 78.9, 79.0, 79.1, 79.2, 79.3, 79.4, 79.5, 79.6, 79.7, 79.8, 79.9, 80.0, 80.1, 80.2, 80.3, 80.4, 80.5, 80.6, 80.7, 80.8, 80.9, 81.0, 81.1, 81.2, 81.3, 81.4, 81.5, 81.6, 81.7, 81.8, 81.9, 82.0, 82.1, 82.2, 82.3, 82.4, 82.5, 82.6, 82.7, 82.8, 82.9, 83.0, 83.1, 83.2, 83.3, 83.4, 83.5, 83.6, 83.7, 83.8, 83.9, 84.0, 84.1, 84.2, 84.3, 84.4, 84.5, 84.6, 84.7, 84.8, 84.9, 85.0, 85.1, 85.2, 85.3, 85.4, 85.5, 85.6, 85.7, 85.8, 85.9, 86.0, 86.1, 86.2, 86.3, 86.4, 86.5, 86.6, 86.7, 86.8, 86.9, 87.0, 87.1, 87.2, 87.3, 87.4, 87.5, 87.6, 87.7, 87.8, 87.9, 88.0, 88.1, 88.2, 88.3, 88.4, 88.5, 88.6, 88.7, 88.8, 88.9, 88.10, 88.11, 88.12, 88.13, 88.14, 88.15, 88.16, 88.17, 88.18, 88.19, 88.20, 88.21, 88.22, 88.23, 88.24, 88.25, 88.26, 88.27, 88.28, 88.29, 88.30, 88.31, 88.32, 88.33, 88.34, 88.35, 88.36, 88.37, 88.38, 88.39, 88.40, 88.41, 88.42, 88.43, 88.44, 88.45, 88.46, 88.47, 88.48, 88.49, 88.50, 88.51, 88.52, 88.53, 88.54, 88.55, 88.56, 88.57, 88.58, 88.59, 88.60, 88.61, 88.62, 88.63, 88.64, 88.65, 88.66, 88.67, 88.68, 88.69, 88.70, 88.71, 88.72, 88.73, 88.74, 88.75, 88.76, 88.77, 88.78, 88.79, 88.80, 88.81, 88.82, 88.83, 88.84, 88.85, 88.86, 88.87, 88.88, 88.89, 88.90, 88.91, 88.92, 88.93, 88.94, 88.95, 88.96, 88.97, 88.98, 88.99, 88.100, 88.101, 88.102, 88.103, 88.104, 88.105, 88.106, 88.107, 88.108, 88.109, 88.110, 88.111, 88.112, 88.113, 88.114, 88.115, 88.116, 88.117, 88.118, 88.119, 88.120, 88.121, 88.122, 88.123, 88.124, 88.125, 88.126, 88.127, 88.128, 88.129, 88.130, 88.131, 88.132, 88.133, 88.134, 88.135, 88.136, 88.137, 88.138, 88.139, 88.140, 88.141, 88.142, 88.143, 88.144, 88.145, 88.146, 88.147, 88.148, 88.149, 88.150, 88.151, 88.152, 88.153, 88.154, 88.155, 88.156, 88.157, 88.158, 88.159, 88.160, 88.161, 88.162, 88.163, 88.164, 88.165, 88.166, 88.167, 88.168, 88.169, 88.170, 88.171, 88.172, 88.173, 88.174, 88.175, 88.176, 88.177, 88.178, 88.179, 88.180, 88.181, 88.182, 88.183, 88.184, 88.185, 88.186, 88.187, 88.188, 88.189, 88.190, 88.191, 88.192, 88.193, 88.194, 88.195, 88.196, 88.197, 88.198, 88.199, 88.200, 88.201, 88.202, 88.203, 88.204, 88.205, 88.206, 88.207, 88.208, 88.209, 88.210, 88.211, 88.212, 88.213, 88.214, 88.215, 88.216, 88.217, 88.218, 88.219, 88.220, 88.221, 88.222, 88.223, 88.224, 88.225, 88.226, 88.227, 88.228, 88.229, 88.230, 88.231, 88.232, 88.233, 88.234, 88.235, 88.236, 88.237, 88.238, 88.239, 88.240, 88.241, 88.242, 88.243, 88.244, 88.245, 88.246, 88.247, 88.248, 88.249, 88.250, 88.251, 88.252, 88.253, 88.254, 88.255, 88.256, 88.257, 88.258, 88.259, 88.260, 88.261, 88.262, 88.263, 88.264, 88.265, 88.266, 88.267, 88.268, 88.269, 88.270, 88.271, 88.272, 88.273, 88.274, 88.275, 88.276, 88.277, 88.278, 88.279, 88.280, 88.281, 88.282, 88.283, 88.284, 88.285, 88.286, 88.287, 88.288, 88.289, 88.290, 88.291, 88.292, 88.293, 88.294, 88.295, 88.296, 88.297, 88.298, 88.299, 88.300, 88.301, 88.302, 88.303, 88.304, 88.305, 88.306, 88.307, 88.308, 88.309, 88.310, 88.311, 88.312, 88.313, 88.314, 88.315, 88.316, 88.317, 88.318, 88.319, 88.320, 88.321, 88.322, 88.323, 88.324, 88.325, 88.326, 88.327, 88.328, 88.329, 88.330, 88.331, 88.332, 88.333, 88.334, 88.335, 88.336, 88.337, 88.338, 88.339, 88.340, 88.341, 88.342, 88.343, 88.344, 88.345, 88.346, 88.347, 88.348, 88.349, 88.350, 88.351, 88.352, 88.353, 88.354, 88.355, 88.356, 88.357, 88.358, 88.359, 88.360, 88.361, 88.362, 88.363, 88.364, 88.365, 88.366, 88.367, 88.368, 88.369, 88.370, 88.371, 88.372, 88.373, 88.374, 88.375, 88.376, 88.377, 88.378, 88.379, 88.380, 88.381, 88.382, 88.383, 88.384, 88.385, 88.386, 88.387, 88.388, 88.389, 88.390, 88.391, 88.392, 88.393, 88.394, 88.395, 88.396, 88.397, 88.398, 88.399, 88.400, 88.401, 88.402, 88.403, 88.404, 88.405, 88.406, 88.407, 88.408, 88.409, 88.410, 88.411, 88.412, 88.413, 88.414, 88.415, 88.416, 88.417, 88.418, 88.419, 88.420, 88.421, 88.422, 88.423, 88.424, 88.425, 88.426, 88.427, 88.428, 88.429, 88.430, 88.431, 88.432, 88.433, 88.434, 88.435, 88.436, 88.437, 88.438, 88.439, 88.440, 88.441, 88.442, 88.443, 88.444, 88.445, 88.446, 88.447, 88.448, 88.449, 88.450, 88.451, 88.452, 88.453, 88.454, 88.455, 88.456, 88.457, 88.458, 88.459, 88.460, 88.461, 88.462, 88.463, 88.464, 88.465, 88.466, 88.467, 88.468, 88.469, 88.470, 88.471, 88.472, 88.473, 88.474, 88.475, 88.476, 88.477, 88.478, 88.479, 88.480, 88.481, 88.482, 88.483, 88.484, 88.485, 88.486, 88.487, 88.488, 88.489, 88.490, 88.491, 88.492, 88.493, 88.494, 88.495, 88.496, 88.497, 88.498, 88.499, 88.500, 88.501, 88.502, 88.503, 88.504, 88.505, 88.506, 88.507, 88.508, 88.509, 88.510, 88.511, 88.512, 88.513, 88.514, 88.515, 88.516, 88.517, 88.518, 88.519, 88.520, 88.521, 88.522, 88.523, 88.524, 88.525, 88.526, 88.527, 88.528, 88.529, 88.530, 88.531, 88.532, 88.533, 88.534, 88.535, 88.536, 88.537, 88.538, 88.539, 88.540, 88.541, 88.542, 88.543, 88.544, 88.545, 88.546, 88.547, 88.548, 88.549, 88.550, 88.551, 88.552, 88.553, 88.554, 88.555, 88.556, 88.557, 88.558, 88.559, 88.560, 88.561, 88.562, 88.563, 88.564, 88.565, 88.566, 88.567, 88.568, 88.569, 88.570, 88.571, 88.572, 88.573, 88.574, 88.575, 88.576, 88.577, 88.578, 88.579, 88.580, 88.581, 88.582, 88.583, 88.584, 88.585, 88.586, 88.587, 88.588, 88.589, 88.590, 88.591, 88.592, 88.593, 88.594, 88.595, 88.596, 88.597, 88.598, 88.599, 88.600, 88.601, 88.602, 88.603, 88.604, 88.605, 88.606, 88.607, 88.608, 88.609, 88.610, 88.611, 88.612, 88.613, 88.614, 88.615, 88.616, 88.617, 88.618, 88.619, 88.620, 88.621, 88.622, 88.623, 88.624, 88.625, 88.626, 88.627, 88.628, 88.629, 88.630, 88.631, 88.632, 88.633, 88.634, 88.635, 88.636, 88.637, 88.638, 88.639, 88.640, 88.641, 88.642, 88.643, 88.644, 88.645, 88.646, 88.647, 88.648, 88.649, 88.650, 88.651, 88.652, 88.653, 88.654, 88.655, 88.656, 88.657, 88.658, 88.659, 88.660, 88.661, 88.662, 88.663, 88.664, 88.665, 88.666, 88.667, 88.668, 88.669, 88.670, 88.671, 88.672, 88.673, 88.674, 88.675, 88.676, 88.677, 88.678, 88.679, 88.680, 88.681, 88.682, 88.683, 88.684, 88.685, 88.686, 88.687, 88.688, 88.689, 88.690, 88.691, 88.692, 88.693, 88.694, 88.695, 88.696, 88.697, 88.698, 88.699, 88.700, 88.701, 88.702, 88.703, 88.704, 88.705, 88.706, 88.707, 88.708, 88.709, 88.710, 88.711, 88.712, 88.713, 88.714, 88.715, 88.716, 88.717, 88.718, 88.719, 88.720, 88.721, 88.722, 88.723, 88.724, 88.725, 88.726, 88.727, 88.728, 88.729, 88.730, 88.731, 88.732, 88.733, 88.734, 88.735, 88.736, 88.737, 88.738, 88.739, 88.740, 88.741, 88.742, 88.743, 88.744, 88.745, 88.746, 88.747, 88.748, 88.749, 88.750, 88.751, 88.752, 88.753, 88.754, 88.755, 88.756, 88.757, 88.758, 88.759, 88.760, 88.761, 88.762, 88.763, 88.764, 88.765, 88.766, 88.767, 88.768, 88.769, 88.770, 88.771, 88.772, 88.773, 88.774, 88.775, 88.776, 88.777, 88.778, 88.779, 88.780, 88.781, 88.782, 88.783, 88.784, 88.785, 88.786, 88.787, 88.788, 88.789, 88.790, 88.791, 88.792, 88.793, 88.794, 88.795, 88.796, 88.797, 88.798, 88.799, 88.800, 88.801, 88.802, 88.803, 88.804, 88.805, 88.806, 88.807, 88.808, 88.809, 88.810, 88.811, 88.812, 88.813, 88.814, 88.815, 88.816, 88.817, 88.818, 88.819, 88.820, 88.821, 88.822, 88.823, 88.824, 88.825, 88.826, 88.827, 88.828, 88.829, 88.830, 88.831, 88.832, 88.833,$

$^{14}\text{C}(^3\text{He},\text{X}): \text{res}$ [1972Ke08,1976Ch04 \(continued\)](#) ^{17}O Levels

Notes:

([1972Ke08](#)) also report excitation functions in the range $E(^3\text{He})=2.2\text{-}7.0$ MeV (α_{0-3}), $3.2\text{-}4.4$ MeV (p_{0-3}), $3.2\text{-}5.5$ MeV (d) and $4.0\text{-}6.1$ MeV (^3He): angular distributions for the α -groups have been measured at a number of energies.

For ^{17}O deduced resonances, J, π , see also ([1970KeZY,1972VeZY](#)).

The variation of the ^3He optical parameters has been studied for $E(^3\text{He})=10\text{-}18$ MeV ([1970Du07](#)).

(Ke70): Keyser et al., Bull. Amer. Phys. Soc. 15 (1970) 1685.

E(level)	$J^\pi \ddagger$	$I^\#$	$E_{\text{res}}(\text{lab})$ (MeV) [@]	Comments
0 871	$5/2^+$ $1/2^+$			E(level), J^π : from Adopted Levels. E(level), J^π : from Adopted Levels.
20489 ^{†&}			2.1 [†]	%n>0 E(level): from $E(^3\text{He})=2.1$ MeV (1961Jo24). %n>0
21066 ^{†&b}			2.8 [†]	E(level): from $E(^3\text{He})=2.8$ MeV (1961Jo24). %IT>0
21725 ^{@ab} 82	$5/2^+$	0.75 MeV	3.6 <i>I</i>	E(level): from $E(^3\text{He})=3600$ keV <i>100</i> (1976Ch04). See also $E_{\text{res}}=3600$ keV (Ke70, 1971Ke08,1972Ke08). %IT>0; %n>0; %a>0
22136 ^{@&abcd} 82	$7/2^-$	0.75 MeV	4.1 <i>I</i>	E(level): From $E(^3\text{He})=4100$ keV <i>100</i> (1976Ch04). See also $E_{\text{res}}=4100$ keV (Ke70, 1970Ho08,1971Ke08,1972Ke08). J^π : (1970Ho08) however suggests $(1/2^-, 3/2^-)$. %IT>0; %n>0; %a>0
22.55×10^3 ^{@ab} 17	$3/2^{(-)}$	≈ 1 [@] MeV	4.6 2	E(level): from $E(^3\text{He})=4600$ keV <i>200</i> (1976Ch04). %IT>0
22960 ^{@ae} 82	$1/2^+$	≈ 0.4 MeV	5.1 <i>I</i>	E(level): from $E(^3\text{He})=5100$ keV <i>100</i> (1976Ch04). See also $E_{\text{res}}=5100$ keV (Ke70, 1972Ke08). %IT>0
23454 ^{@ab} 82			5.7 <i>I</i>	E(level): from $E(^3\text{He})=5700$ keV <i>100</i> (1976Ch04). %IT>0
24442 ^{@a} 82			6.9 <i>I</i>	E(level): from $E(^3\text{He})=6900$ keV <i>100</i> (1976Ch04). %IT>0

[†] From ([1961Jo24](#): $^{14}\text{C}(^3\text{He},n_0)$).

[‡] From ([1976Ch04](#): $^{14}\text{C}(^3\text{He},\gamma)$). See also ([1971Ke08](#): $^{14}\text{C}(^3\text{He},\alpha)$, [1972Ke08](#): $^{14}\text{C}(^3\text{He},\alpha/d/p/^3\text{He})$, Ke70: $^{14}\text{C}(^3\text{He},^3\text{He}/\alpha)$).

[#] From ([1972Ke08](#)) except where noted.

[@] From ([1976Ch04](#)) except where noted.

[&] Observed in ($^3\text{He},n$).

^a Observed in ($^3\text{He},\gamma$).

^b Observed in ($^3\text{He},\alpha$).

^c Observed in ($^3\text{He},p$).

^d Observed in ($^3\text{He},d$).

^e Observed in ($^3\text{He},^3\text{He}$).

$^{14}\text{C}(^3\text{He},\text{X})$: res 1972Ke08,1976Ch04 (continued) $\gamma(^{17}\text{O})$

E_γ^\dagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Mult. [†]	Comments
20855 [‡]	21725	5/2 ⁺	871	1/2 ⁺	E2	
21679	22.55×10^3	3/2 ⁽⁻⁾	871	1/2 ⁺	E1	
21725	21725	5/2 ⁺	0	5/2 ⁺	M1+E2	The integrated E2 strength for 21725 and 22960 states was estimated to be about 1.5% of the E2 sum rule.
22136	22136	7/2 ⁻	0	5/2 ⁺	E1	
22550	22.55×10^3	3/2 ⁽⁻⁾	0	5/2 ⁺	E1	
22960	22960	1/2 ⁺	0	5/2 ⁺	E2	

[†] See (1976Ch04).[‡] Placement of transition in the level scheme is uncertain. $^{14}\text{C}(^3\text{He},\text{X})$: res 1972Ke08,1976Ch04

Legend

Level Scheme- - - - - ► γ Decay (Uncertain)