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    "eps0 = 8.85e-14 # [F/cm] Permitividad eléctrica en el vacío\n",
    "c0 = 3e10 # [cm/s] velocidad de la luz en el vacío\n",
    "h = 6.623e-34 \# [J/s] Constante de Planck\n",
    "m0 = 9.1e-31 # [kg] masa del electrón en reposo\n",
    "Vtha = k*300/q \# [V] voltaje térmico @ 300 K
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    "NSi = 5e22 # [m^3] Átomos por unidad de volumen\n",
    "rhoSi = 2.33 \# [g/cm^3] densidad\n",
```

```
"EgSi = 1.12 # [eV] energía de banda prohibida\n",
    "niSi = 1e10 # [m^3] concentración intrínseca\n"
    "munSi = 1430; mupSi = 480 # [cm^2/Vs] movilidad Nd,a < 1e15\n",
    "ErupSi = 3e5 # [V/cm] Campo eléctrico para ruptura dieléctrica\n",
    "kapaSi = 1.5 # [W/cm°C] conductividad térmica\n",
    "CpSi = 0.7 # [J/gK] Calor específico \n",
    "DthSi = 0.87 # [cm^2/s] Difusividad térmica\n",
    "epsSi = 11.7*eps0 # [F/cm] Permitividad eléctrica\n",
    "nSi = 3.44 # indice de refracción \n",
    "chiSi = 4.05 # [eV] Afinidad electrónica\n",
    "men = 0.867*m0; meng = 1.08*m0*1.07 # [kg] masa efectiva electrones para cálculo en
conductividad y densidad, respectivamente.\n",
    "mep = 1.156*m0; mepg = 0.81*m0*1.07 # [kg] masa efectiva huecos para cálculo en conductividad y
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    "NSiO2 = 2.3e22 # [cm^3] Átomos por unidad de volumen\n",
    "rhoSiO2 = 2.27 \# [g/cm^3] densidad\n",
    "EgSiO2 = 3.9 # [eV] energía de banda prohibida\n",
    "munSiO2 = 20; mupSiO2 = 1e-8 \# [cm^2/Vs] \n",
    "ErupSiO2 = 1e7 # [V/cm] Campo eléctrico para ruptura dieléctrica (es mayor a este valor!!!)\n",
    "kapaSiO2 = 0.014 # [W/cm°C] conductividad térmica\n",
    "CpSiO2 = 1.0 # [J/gK] Calor específico n,
    "DthSiO2 = 0.006 # [cm^2/s] Difusividad térmica\n",
    "epsSiO2 = 3.9*epsO # [F/cm] Permitividad eléctrica\n",
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    "Na = 5e15 \# [cm**-3]\n",
    "Nd = 1e16 \# [cm**-3]\n",
    "Wmp = 10e-4 # [cm] ancho región tipo p\n",
```

```
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V/xccPHWLV2FUySyejv3tZvL/gtIiwRAID/7PsPNn6/UR+DBo/nQTJJeGjSQ4gy639ZfH7ocxQcLTDGqGmax3P988yfIzEsEYqio0 BoAdYfXQ8JEmRZBjQYPwMSJNyUfhNSY1Khqio2HduE9eXrjW3JsmwUzBIkzBs+D6lRqZBlGSXHS7DuyDpjjCaTCSaTCaqqAgBmpcw y+u6r3Yd1h9d12CeTpPe/KOkiDIkaAgA41nwMBeUFUFXVY59kWYYECZ1xmRgaNRQA8H3T99h8fDMAQFPb9kmS9LGPHTgWKREpAIDq lmp88/03kM0yFKeC7Y7tMB0wwSJbYDKZMGrgKKREpEBVVdQ76rH1+FbIJrltnzQYPx9Do4diaMxQKIqCJmcTSqpKjOdANumvSwkSI AGJYYkYGqOPt8nehO+qvzO2Y5b1C9ipLhUSJAwIHYDB4YNhsVjgUBzYU73H+JmRJRlms1nPQ9UQYYlAnC1O/3mSTThSd8TIySTpWZ hlMzRVg@WyIDIk@ngdNCgNcCkuj59fs2zW83ZpsJgsxs83JP25V5yKx8X23OtHTj3Vuqt2i8UCVVU9/j0VJAlms9lod/8uUxQFFov F+B3h1v73Xmft3v7ec7e7H8+f+3Rqe6Duk1v77Qf6PvVWTt7oN8XQPffcg5KSEqxfv77DfaderdP9H1dXlixZgieeeKJDe35+PsLC wgAAqampyMrKQklJCQ4dOgQAWLVqFdLS0pCeno5NmzahsrLS+N7MzEwMGTIE69atQ319vcdYPMaGtpkiRdXfpditvrkeds2OzjQrz aiqqsKGDRsAABV1FahVazvta3Hpv2j37NmD0tJSHKw7i0Pq8U77NjQ1YM+ePcY+7SzfiXJXead9w6QwrFy5EtnZ2UhISMC3h77Ffu f+TvuaYTb2bc6c0dh9Yje+rfq2074AsHL1SpgkEyIjI7HbtBtfV3zdZd9PPvsEVskKANiIjdil7MKu8l2d9p1tmg17jf6cftr0KTYAL12d9PPvsEVskKANIIjdil7MKu8l2d9p1tmg17jf6cftr0KTYAL12d9PPvsEVskKANIIJdil7MKu8l2d9p1tmg17jf6cftr0KTYAL12d9PPvsEVskKANIIJdil7MKu8l2d9p1tmg17jf6cftr0KTYAL12d9PPvsEVskKANIIJdil7MKu8l2d9p1tmg17jf6cftr0KTYAL12d9PPvsEVskKANIIJdil7MKu8l2d9p1tmg17jf6cftr0KTYAL12d9PPvsEVskKANIIJdil7MKu8l2d9p1tmg17jf6cftr0KTYAL12d9PPvsEVskKANIIJdil7MKu8l2d9p1tmg17jf6cftr0KTYAL12d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskKANIIJdil7MKu8l2d9PPvsEVskWANIIJdil7MKu8l2d9PPvsEVskWANIIJdil7MKu8l2d9PPvsEVskWANIIJdil7MKu8l2d9PPvsEVskWANIIJdil6Nna53V9m/hJfr/4aiqLg0+ZPsd7e8WfN7fpR1yPMFYY1a9ZgdctqrG5Z3WXfhJoE/PSyn+Lw4cP459f/xGctn3XZVzuoYerwqcjK 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YUs5bClD1Y6Db84Xrwd8clfUCHRdd3oInqfrOrZv386WNrGjHLaUw5YyVO04cHO++F0kkG6o3MTGsiynh+B5lmWhubmZLW1iRzlsK $\label{lem:continuous} YctZajacWCrd/ymB9INlZvYEBER0cXp9fhzogB0bIiIi0hTwTg/2TsWvDvyYXDxsH1+vx8lJSVsaRM7ymFL0WwpQ9W0TlyxkW6o3Kntyfflowered and the standard and$ 4o1bbeOUHTNBQWFjo9DM9jRzlsKYctZajaMbzGJp4355P+va3cLEC1FepO0HUdmzdvZkub2FEOW8phSxmqdoz3c6IA7ooakWor1J1 gWRY6OzvZ0iZ2lMOWcthShqode/X4Ptkb4K4oIiIiipFgKP73sZHGiQ0REREBGHgIZrJHnxMFKDixUW2FuhP8fj/KysrY0iZ2lMOW cthShqodI2ts4vhWFHdFjYC7ouzTNA35+fl0D8Pz2FEOW8phSxmqdux14K0oZXdFrV69GnPmzEFGRgYyMjJQVlaG119/fdRfJxQKx $\label{lem:wboyosofmkgdrvy0iZ2lMOWcthShqodB96Kit/0QLqhayY2U6d0xRNPPIG9e/di7969WLRoEVasWIEPPvjA6aGNSaptYXQKO8phSzinglar and the state of the state$ lsKUPFjgNvRXn3LTbXvBW1fPnyqD8//vjjWL16NXbu3Ikrr7zSoVERERGNHeE7D3v5kQqumdgMZhgGXnrpJXR3d6OsrGzIzwkGgwg Gg5E/d3R0AOi/pBW+rKVpGvx+PwzDgGmakc8NH9d1PWr/vN/vh6Zpwx4/+3JZINCf7+xZ+3DHExISYJomDMOIHPP5fAgEAsMeH27s sTyn8OcN/pjXz2moscf6nMIGj8fr5+TU6zTUz6TXz2mo4/E6p8EtVTknJ14nYKCjKufU09d/PEHr/5x4nZMkV01s9u3bh7KyMvT29 iIttQ3r1q3DzJkzh/zcVatWYeXKleccr6ysxLhx4wAABQUFKC0tRU1NDerr6yOfU1RUhOLiYuzevRvNzc2R4yUlJSgsLMS2bdvQ2d kZOV5WVob8/Hxs3Lgx6gUoLy9HSkoKKioqosawdOlS9PT0oLKyMnIsEAhg2bJlaGlpwY4dOyLH09PTsWjRIjQ0NKC6ujpyPC8vDws WLMDBgwdRW1sbOR6Pc0pOTgYAbNq0SZlzcuJ1KikpwaRJk6I6ev2cnHydgIGfSVXOyYnXqaqqKqqlCufkxOvU1tYW1VGFc2ppacHR xhMANHy0/31sCx6Jyznt3r0bknyWi26b2NfXh/r6erS1teHll1/Gr371K2zdunXIyc1QV2ymTZuG5uZmZGZmAnDvjNjt/+ViWRZ6e 3sRCATg8/mU0Kehxh7rc9I0DcFgEJqmRTp6/ZycvGJz9s+k189pq0Px0KfwVe1wSxX0yYnXyTAMBIPBSEcVzsk0TfzVczux+8hp/0 x/z8GyOZPick6nTp1Cbm4u2tvbkZGRAbtcNbE524033ogZM2bg2WefHfFzOzo6kJmZiZaWFuTk5MRhdOoKhUKoqKjA0qVLkZCQ4PR wPIsd5bClHLaUoWrHFf/xNt5raMPzd87HTTMnx0V7Sk9sXL06yLKsqKsyREREFDtBB57uLc01a2weeeQRLFmyBNOmTUNnZyfWrl2L LVu24I033nB6aERERGNC5D42305t38mTJ3HHHXegsbERmZmZmDNnDt544w3cdNNNTg+NiIhoTIjcedjDz4py9Rqb0QivsWlra4ssH qaLY11WZJtfeKEmjR47ymFLOWwpQ9WOpf+0EafPhLDp77+Ayyakx+V7tre3Iysra2yssSHnhLfXkj3sKIct5bClDBU7Dtygz7tXbJ Sb2Kh4i+t403UdlZWVbGkTO8phSzlsKUPFjpZloVeP/+Jh6YbKTWyIiIho9EKGhfDiFC8/K4oTGyIiIopcrQG8vd3buyOnmArfnZL sYUc5bCmHLWWo1jG8I8rnAxL93p0eKLcrSmpVNRER0VjS0HoG1z5ZieQEDQf+eUncvq/072/vTsmGMfj5FHRxTNNEU1MTW9rEjnLY Ug5bylCxYzCycDi+62ukGyo3sRn8oC660IZhYMeOHWxpEzvKYUs5bClDxY5n+vrPJSXOExvphspNbIiIiGj0IhObRO/uiAI4sSEiI iIAPZ90bMZxYuMuKt3a2ik+nw/p6elsaRM7ymFLOWwpQ8WO4Ss24xLiu9tLuqFae9Wg3vY7JwQCASxatMjpYXgeO8phSzlsKUPFjm f6+u8AHO+3oqR/byt3xUalFepOMU0TdXV1bGkT08phSzlsKUPFjj0hZ96K4q6oEai0Qt0phmGgurqaLW1iRzlsKYctZajYscehxcP cFUVERETiznDxMBEREali4K0ob69VVW5io9IKdaf4fD7k5eWxpU3sKIct5bClDBU7RhYPx/kGfdwVNQLuirIvEAhgwYIFTg/D89hR DlvKYUsZKnZ06gZ93BU1ApUWcjnFMAwcOHCALW1iRzlsKYctZajY0akb9HHx8AhU2nrnFNM0UVtby5Y2saMctpTDljJU70jUs6K43 ZuIiIjEDVyx8faSDk5siIiICGdC/YuHud3bZTRNuVOKO03TUFBQwJY2saMctpTDljJU70jU4mHpht6+3jQEv9/bM0038Pv9KC0tdX 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UlBSnh6AEdpTDlnLYUoZKHXkfm7PU1tbil7/8JR588EE8//zz+PWvf41vf/vbEl961FRazOUUXddRUVHBljaxoxy2lMOWMlTr6OSu KFc+KyotLQ2HDh2K/Pmqq65Ca2urxJcmIiKiGLIsa+A+NgpcsRF5Y+vZZ5/FLbfcgiVLluCKK67Ahx9+iIKCAokvTURERDF0ps9A+ DmU6UkJzg5GgMgVm9mzZ2Pv3r2YN28e6urqMGPGDPzhD3+Q+NJEREQUQ93B/reCNB+QnOD9zdI+axTPC7/nnntw1VVXobS0FHPmzE FSUlIsxzYqHR0dyMzMRFtbGzIzM50ejqdZlgVd1xEIBBzb3aYCdpTDlnLYUoZKHQ81d+GGp7YiIzmAmh9+Me7fv729HVlZWWhvb0d GRobtrzeqt6Kqqqrw29/+Fj09PQgEAiguLsZVV10VmeyUlpYiLS3N9qDIeT09PUhPT3d6GJ7HjnLYUg5bylClY/iKTVqSGlvXR3XN adeuXejs7MT777+PNWvWYPHixWhoaMDKlStx3XXXISsrC8XFxbj//vtRW1sbqzGflyor1J2k6zoqKyvZ0iZ2lMOWcthShkodu3o/n dgkOzOxkW446rPQNA0zZ87EzJkzcfvtt0eO19XVoaqqCu+88w7eeOMN/PrXv8bGjRuxcOFC0QETERGRnK6xfMXmkUcewe7du4f8WG FhIW655Rb88z//M/bs2YPvf//7ePjhh0UGSURERLERntikjsWJTWNjI7785S9j0qRJ+Pa3v40NGzYgGAwO+b133nkn3nvvPZFBUvy pcptwp7GjHLaUw5YyV0kYntik0/RWlLRR7YoC+leCv/XWW3jttdewfv16HDt2DDfddBNuvvlmfPnLX0Zubm7kc/ft24fZs2eLD3oo 4V1RUquqiYiIxoJfbPkYT75Ri6/0m4p//ercuH9/6d/fo96w7vP5c0211+LJJ5/EgQMHsHv3bnzuc5/D888/jylTpuALX/gCfvKTn +DYsWNxm9QMZppm3L+nakzTRFNTE1vaxI5y2FIOW8pQqaPTi4elG9q+E88VV1yB7373u3j77bdx9OhR3HXXXXjzzTfx4osvSoxv1A zDcOT7qsQwDOzYsYMtbWJHOWwphy11qNTR6e3e0g1HdRYj3aAvLy8Pd999N+6++27RQRIREVFsdCq2K4o36CMiIhrDnH4rStqozmL Xrl0wTRMHDhxAVVVV5H+vvfYaTp8+DU3TcOmll+LGG2/EAw88gKKioliNe1hev7W1G/h8PqSnp7OlTewohy3lsKUMlTp29zl7xUa6 4ah3RQ3n7Bv0ffDBB3G9QR93RREREY3eimfewntH2/Gfd83HDVdMiPv3d3xX1HDccoM+FVaoO800TdTV1bGlTewohy3lsKUMlTo6f YM+1+2KGs5ob9C3atUqXH311UhPT0d+fj5uueWWi3relAor1J1mGAaqq6vZ0iZ2lMOWcthShkodnX6kgnTDmE1sCgsLsWPHjgv+/K 1bt+K+++7Dzp07sWnTJui6jsWLF607uztWQyQiIhrzuoP9E4sxuStqtEZzg7433ngj6s9r1qxBfn4+3nnnHXzhC1+QHhoREdGYZ5r WwBWbsbgrKp7a29sBANnZ2UN+PBgMRj2nqq0jA0D/489DoRCA/ieR+/1+GIYR9R5e+Liu6xi8dtrv90PTtGGPh79uWPg5IWc/cn24 4wkJCTBNM+qym8/nQyAQGPb4cGOP9Tn150REjV+Fc4r36+Tz+ZCbmxv19b1+Tk6+Tmf/TKpwTk68ToZhRLVU4ZyceJ0sy4rq6NVz6 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Uw5YyVOnY3ffpXYcTnZvYeOaRCk5R4YFkTjNNE/X19WxpEzvKYUs5bClDlY7hG/Q5ecXGMw/BJCIiInfr5uJhIiIiUkV48XA6Jzbu 5fUV6m6gaRqKiorY0iZ21M0WcthShiod3bDdW91dUVK4K8o+v9+P4uJip4fheewohy3lsKUMVTp2uWCNDXdFjeDs52LQ60m6ju3bt 70lTewohy3lsKUMVToO3MfGuYsC0g2Vm9i48JmenmNZFpqbm9nSJnaUw5Zy2FKGKh07Pr2PTUby0M+UigfphspNbIiIi0jCtPf0T2 wyU5yb2EjjxIaIiGgMMk0LHZzYuB8XD9vn9/tRUlLCljaxoxy2lMOWMlTo2NWnw/z0XaAMByc20g2V2xXl9a13bqBpGgoLC50ehue xoxy21MOWM1To2H6m/2pNUkBDcoJzEzTp39vKzQK8vkLdDXRdx+bNm9nSJnaUw5Zy2FKGCh3dsr6Gu6JG4PUV6m5gWRY6OzvZ0iZ2 lMOWcthShgod3bK+hruiiIiIyLbwFRsn19fEAic2REREY5Bb3oqSptzExssr1N3C7/ejrKyMLW1iRzlsKYctZajQMXxzPqcnNtwVN QLuirJP0zTk5+c7PQzPY0c5bCmHLWWo0NEtV2y4K2oEoVDI6SF4XigUwoYNG9jSJnaUw5Zy2FKGCh3dssZGuqFyExuS4eUtjG7Cjn LYUg5byvB6x/ae/vE7fcVGGic2REREY5Bb3oqSxokNERHRGMSJjUcEAsqth467QCCA8vJytrSJHeWwpRy21KFCR7fcoE+6oXITG5K RkpLi9BCUwI5y2FIOW8rwekdesfEIry/mcgNd11FRUcGWNrGjHLaUw5YyvN7RsizXTGz4rCgiIiKypbvPgGH2P6PJ6YmNNE5siIiI 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9dptUFcvBtVhWvgvbFuC6AWxUHxj4IKYuV2KxWKn4U1q3yWKxVMnLo9t0huXe8j5Vt4/V5zYNi41gQ8ZJXr+2F2N6VB1LZrT3Scs+ VtNyo22TJ/c9gEOHDlXJy5u3ydPvkztn9XlVc1Tm9DsUq6rqWhYXF1fpsF1tJSYmkpiYaNiZAQ6Hg5SUFKKiomRaZy34RF6KA7b9D CvfhQNry5efPxoGPggxA912FWufyKue6ZFZXrGNkEDnh9Gdg9sxukcrWocG1cu660r2MW0kL+3c+fntVc1ReHg4FovFdZSoTGZmZo 0DrmsrISGBhIQE13WOhNBNaQEk/w/+TnTe/BXAEgC9rof4BGgRq2t5ov6V2hVeXJDGXzuz+TFhECGBfphMJq9pjITwNl7VHPn7+xM XF0dSUlKlMUdJSUlceeWV0lYmhBsUHHPe2mPNTCg+6VwW1Mx5A9gL7obGEbqWJ/SRmVdMwv82sHbvCQCWbc/m8p5ySQYhPMlwzVF+ fj47d+50fb9nzx5SUlIICwsj0jqaqVOnMmnSJPr160d8fDwzZ84kIyODyZMn61i155lMJlq0aFHllKKonlfllXMAVr4HGz5zXpsIo Fk751Gi3jeCfyOPl+BVeRlEfWS2ft8J7v/feo7mlhASYOXt63tzcZe6HSXXi+xj2khe2rkzK8PNVvvzzz8ZPnx4leW33nors2bNAp wXgXzttdc4fPgw3bt356233mLIkCF1Wm/FMUfbt283301DhA/K3gkr3oKNc0A5NUOkVS8YPBW6jAVz1YGIomFQVZUv12Tw3Pwt2Bw qnSIaM/OWfrQL93yjLIS3knureZBR763mcDjYsWMHnTp1qnb0vqjM0HkdSoG/3oS0+bhmnp13EQx+BDqMcNsgay0MnZdBeTKzj5fv 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ancho lado N\n",
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ancho lado P\n",
```

```
"\n"
  "JonD2 = q*niSi**2*DPn/((Wmp-WdnD2)*Na) # Corriente de saturación\n",
  "JopD2 = q*niSi**2*DNp/((Wmn-WdpD2)*Nd) # Corriente de saturación\n"
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z W 5 Y q c 5 a B C A F K S A I gu A 5 H E + F B V N g 1 E W I 5 V 6 z W 5 Y q c 5 a B C A F K S A I gu A 5 H E + F B V N g 1 E W I 5 V 6 z W 5 Y q c 5 a B C A F K S A I gu A 5 H E + F B V N g 1 E W I 5 V 6 z W 5 Y q c 5 a B C A F K S A I gu A 5 H E + F B V N g 1 E W I 5 V 6 z W 5 Y q c 5 a B C A F K S A I gu A 5 H E + F B V N g 1 E W I 5 V 6 z W 5 Y q c 5 a B C A F K S A I gu A 5 H E + F B V N g 1 E W I 5 V 6 z W 5 Y q c 5 a B C A F K S A I gu A 5 H E + F B V N g 1 E W I 5 V 6 z W 5 Y q c 5 a B C A F K S A I G A I G A ITvJ63+9zsJDCx2LMPqZ/UhomsBtrW6jXWi7UuNVbIrKn/symbvxKIu3n6LAcmGj1tioOgzv1JD46AaEBfhci53gBkhhJAiCILg/F2 3pgWKFpJfgjm+v61RP//k0ST1JkGN/3LJOS+5ofQdDmw0tNYhaVVV2nMhm7sZj/LL5OBk5F2aUNQn1Z2Tnxozs3IjI0PJXsRY8Eym MXIzRaCQyMlLzi2/pxRP04yqe2sNtXTP3wtwJcGyD/XHbm+GmaZV/eUEmdXzqYDLab7E0DWqKESMDIwdyV9u7iK0XW6p36ERWAb+k HmfuxmPsPpXjaA/292JYh4aM7NKIzhHBbj/by23zWQ0401WTs9JGjhzJsmXLGDhwID/99BMAR44cYcyYMaSnp2M2m3nxxRe57bbbK 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9m+OlalVVeXPfZnMWnWIpbsv3C5rWrcWY+OiuCW2MQGy7pBQBar6+e12hZG7Ul2FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxVN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWKFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWWFfTp06fKA8Q8Cb14gn5cxWN7OM112FkdVqZcWWfTp06fWfTp//g18ehKAvMfjD4Neg2HoxGdpzewbSUaaw5YZ+27Wvy5Z729/BQzCP8tuU4n644wK6TF6aL92sdxrgeTejTMsxpq1LrJad68YTLu1 b181vbPykPQFVVcnJyykzV1xp68QT9uIqn9nCaq6XQXhQ1ioWRn0DdlqRlp/GfTf9h0aFFAJiNZka3Hs3olmNJ2ppPn7eTOZldCIC /t4nbu0ZwT1wUza7ydtnl0EtO9eIJznWVwkgQBEG4dvLPgH+I/ftOd4HZB9qNILP4HB+vfZ3/7fkfVtWKAQNDmw3ltmb3s2izhWEL 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sta6iqkSA1hjubPMfK05ex4K5/c0eHPjU760/gCpjR83xRZICej8GDyfb9zgRBEAShEnhMj1FeXh4dO3bk3nvv5ZZbbinz/A8//MDkyZ OZPn06PXv25JNPPiE+Pp4dO3YQGRkJQHBwMJs3b+bUqVOMGjWKW2+91Xr16tW0SilMJhOdOnXCZHLvXdszcop4ddlM/kyfi82cDti 3EzNbG3B9+I08dv3ttAlrXOHrq90z/wx8dwdY8iA4CkZ+AlFx1XOtK+ApOb1WxFN76MVVPLWHM109claawWBg7ty5jBgxwtHWvXt3 unTpwowZMxxtbdu2ZcSIEUydOrXMOR5++GEGDBjAbbfdVu41ioqKKCoqcjzOzs4mIiKCzMxMx6h2o9GIyWTCZrOVWm2zpN1qtZa6X WcymTAajRW2WyyWUjGYzfa69dLBZBW1e315oShKqSXRDQYDZr05wvaKYrfZbBQWF7Nq/x1+TD108u4MTGFz8Q5Zi6p4E+HVg7HRt3 FrdA/MZrNbOBlTPseUvgPboNdQvGqV66TFPImTOImTOIlTxU5nzpwhNDS00rPSPKbH6HIUFxeTkpLCM888U6p9yJAhrF69GoBTp07 h5+dHYGAg2dnZrFixgocffrjCc06d0pVXX321TPuSJUscY5UiIyPp3LkzW7ZsIS3twnYSrVu3pk2bNvz1119kZGQ42jt16kRUVBQr VqwgJyfH0e7n58eAAQNYsmRJqTdT//798fPzIzExsVQMCQkJFBQUkJyc7Ggzm80MHTqUzMxM1qxZ42gPCAhgwIABHDlyhNTUVEd7W FgYPXr0YO/evezevdvRHhkZSUTLdjwy9012FP1B3rG7UAqi7F6+Q6hnakq/2i0IMvvA4bMcq3OsXKe4uDjCw8PLOPXp04fatWtfu1 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  "JopI = q*niSi**2*DNp/((Wmn-WdnI)*Nd) # Corriente de saturación\n",
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(0.680+0.711)/2\n,
    "Vapp = np.linspace(-1000,0,1000) # tensión inversa\n",
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    "Jbo = np.zeros((len(Na),len(Vapp)))\n",
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    "for i in range(len(Na)):\n",
         Vbi = 550e-3 + Vtha * np.log(Na[i]/niSi)\n",
         VR = Vbi - Vapp\n",
         Wdp = np.sqrt(2*epsSi*(VR)/(q*Na[i])) # ancho lado P\n",
         muPn = muminN + (mumaxN - muminN)/(1+(Na[i]/NrefN))**aN # Minoritarios lado P\n",
         Jbo[i,:] = q*niSi**2*muPn*Vtha/((Wmp-Wdp)*Na[i])\n",
         Em = np.sqrt(2*q*Na[i]*np.abs(VR)/epsSi)*100 # campo eléctrico máximo (x=0)\n",
         Tt = np.exp(-8*np.pi*np.sqrt(2*meef)*((EgSi*q)**(3/2))/(3*q*Em*h))\n",
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  "Na = 5e15 \# [cm**-3]\n",
  "Nd = 1e16 \# [cm**-3]\n"
  "Wd = np.sqrt(2*epsSi*(Na+Nd)*(Vbi-Vapp)/(q*Na*Nd)) # [cm]\n",
  "Wdn = np.sqrt(2*epsSi*Na*(Vbi-Vapp)/(q*(Na+Nd)*Nd)) # ancho lado N\n",
  "Wdp = np.sqrt(2*epsSi*Nd*(Vbi-Vapp)/(q*(Na+Nd)*Na)) # ancho lado P\n",
  "Wd0 = np.sqrt(2*epsSi*(Na+Nd)*Vbi/(q*Na*Nd)) # [cm] en ETD\n",
  "Wdn0 = np.sqrt(2*epsSi*Na*Vbi/(q*(Na+Nd)*Nd)) # ancho lado N en ETD\n",
  "Wdp0 = np.sqrt(2*epsSi*Nd*Vbi/(q*(Na+Nd)*Na)) # ancho lado P en ETD\n",
  "Qjp = -q*Na*Wdp # C/cm2\n",
                    # C/cm2\n",
  "Qjn = q*Nd*Wdn
  "QVp = -q*Na*(Wdp-Wdp0)\n",
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  "Cj = epsSi/Wd # F/cm2"
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  "QT = np.abs(Qn) + np.abs(Qp) \n",
  "Cdn = np.abs(Qn)/Vtha\n"
  "Cdp = np.abs(Qp)/Vtha\n",
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18/4/24, 21:34
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